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**Secretary Redfield, Who Will Have Much to Do With the Readjustment Problems.**

# Problems of Industrial Reconstruction

## *Message to Readers of Electrical Review on Importance of Reconstruction—Calmness of Spirit and Absence of Haste Necessary*


By WILLIAM C. REDFIELD

*Secretary, Department of Commerce.*


The problems of industrial readjustment are themselves so great and are so intermingled with other great phases of the work needing to be done in the coming months that readjustment to all the multiplex and novel conditions arising out of the war is a delicate and difficult matter; hence, calmness of spirit, absence of haste and a quiet mind are necessary to deal with them effectively. Those in all lands who are closest to the coming duties seem most desirous to learn and most reluctant for the present to attempt to teach.

For the future the veil seems slowly to rise. Does it rise upon a stage on which, instead of a fight for self-preservation, we are free, you and I, now and at once, to enter upon a contest of self-interest? Upon the answer America makes to that plain question depends the international good will of America. Are we free now, you and I, American manufacturers, to go about our personal efforts for our personal gain and to make the most that we can, as we once properly did, out of every opportunity that may be before us? Are we free so to do?

We should not forget, we must not forget, that much of the freedom of our own land now has been secured in safety and in honor to us by the sacrifices of others, made before we recognized that this was our fight as well as theirs. Take it to heart. They fought, they bled, they suffered, they sacrificed, they died for us. Forget not, men of America, at home and abroad, the English and the Welshman, the Scotchman, the

Frenchman, the Irishman, died in your behalf. Let us not forget.

The question of the means wherewith to pay for what they need is a serious and very solemn question for those who must have, as well as for those who must sell. And if to this we add the question: What of the sixty-odd millions of Germany and scores of millions of Austria-Hungary, what as to their needs and what as to their power to buy and what as to the source whence must come the credit with which they can pay? It must make you and me thoughtful in our offices as to what the future financially is to be in its future demands for your sacrifices here in this favored America.

Now, as to materials, do you realize what that call must be? That in England and in France, and in Belgium, Poland and in Serbia not less than a million dwellings must be built as speedily as may be. In one country, because they have refrained from building for their ordinary needs; in other countries because they have been destroyed; in all these countries, even in the undisturbed regions, because they have gone without the usual repairs. Lumber and cement and hardware and electrical material on a vast scale has to be furnished by somebody. And in so far as it must be furnished by us, there is some chance that we must also furnish for a time the means wherewith to finance it.

We look to better days, when the world once more will be free for the kindly contest of peace. We need not fear those days when they come. But I would like you to remember that in those days it will be true —as it has been true in the past—that Great Britain, that great industrial nation, our competitor, in all honor and fairness was also always our largest customer.

We must remember this in our thinking. We must not be turned aside by lack of vision to see the end. We must in justice and fairness give to all others as we would expect to receive ourselves and in this situation, in the words of President Lincoln, "Have a calm and enlarged vision of the signs of the times."

## MARINE WILL DO ITS PART.

By Josephus Daniels,
*Secretary of the Navy.*

The government will build ships, pioneer new routes of trade, guarantee freight rates at cost to introduce American-made goods and enjoy a fair share of the carrying trade of the world. And it will continue large naval construction, not because it wishes a navy to overawe small nations. Far from it, but to insure freedom of the seas to small and great nations alike and to contribute our share to the police of the world.

## PROSPECTS FOR FUTURE REASSURING.

**Government Will Co-operate with Business in Readjustment to a Peace Basis.**

By George M. Reynolds,
*President, Continental and Commercial National Bank, Chicago.*

I have been impressed with a number of features which will figure in the period of reconstruction into which we are now entering, and, all told, I view with considerable satisfaction and assurance the prospects ahead.

If we have learned any one lesson from the war, besides discipline, it is the value of co-operation and co-ordination. The attitude of the government as voiced by Secretary McAdoo and the feeling of the steel interests after their reception at Washington indicate a desire, and probably an intention, on the part of the government to co-operate with big business and other important interests in avoiding as much as possible undue shocks in the transition from a war to a peace basis.

### Encouragement in Policy.

It will mean a great deal for labor and the employers of labor and general stability, if the government follows its indicated policy since in that event there will be encouragement to go ahead and a lessening of the fear that large supplies of goods accumulated at high prices may have to be sold at a loss. The proposed reduction in taxes as advocated by Secretary McAdoo is in line with the sentiment of the country.

The steel interests, after their conference at Washington, came away believing that the government is sincere in a desire to conserve active business. As a part of this plan there will be no abrupt cancellation of government orders.

There is to be no halting in the shipbuilding program. There will be a world demand for tonnage and there must be ships to transport food and materials to European countries. In uses for steel the men identified with the industry believe the foreign requirements will take up substantially the slack or carry over from government contracts.

There is a general feeling that where possible, industries will be allowed to slow down and the reduction in the cost of living and wages be made so gradual that the possibility of economic disturbance will be minimized.

### Money Problems Difficult.

As to the money outlook the problems that will be presented to the bankers are more difficult now than they were during the period of the war. Then the urgent requirements for money were for industrial work in which the government was interested and a bank felt but little reluctance in lending $1,000,000 or $10,000,000 because it could be safely assumed there were profits in the undertaking, since the government was identified with the contracts and would see an honestly conducted business through.

Now that is over. The banker, when asked to lend $5,000,000 or $10,000,000 to go into enterprises concerned with world trade must assure himself about the character of the organization of the borrower and have some idea of the prospect of profits. The banker must enlarge the scope of his information and it will not be as easy to secure money now as heretofore.

I can as yet see no prospect of an easier money situation. For the reasons I have named large borrowing will be more difficult and while prophesies are uncertain I feel that the new situations arising will necessarily make for more caution in money lending."

## PRESENT COPPER PRICES TO STAND.

The American copper industry, through a committee of producers and refiners has agreed with the War Industries Board to maintain the present rate of production and preserve existing levels of prices and wages. Government regulation of prices and allocation of materials will continue, the entire agreement to remain in effect until next January 1.

# ECONOMIC ASPECTS OF INDUSTRIAL RECONSTRUCTION

## *Survey of Factors that Will Play a Dominant Part in the Coming Industrial Expansion of the World—Views and Comments of Industrial Leaders*

With peace an accomplished fact, we are face to face with its problems and with those involved in the readjustments of finance and business from a war to a peace basis. And the most important question confronting our industrial and financial leaders is: What will be the major trend of economic developments?

The best approach to an answer to this question seems to be an interpretation of relevant developments already in process before the war intervened. The provision of essential transportation agencies in the industrial and geographical frontiers of the world indicates that a combination of economic forces was laying the foundations before the war for a period of unusual world-wide industrial expansion. It appears likely that after the brief period of readjustment the world war will be found to have accelerated this movement materially.

### Reasons For Expansion.

These pre-war preparations for industrial expansion were the logical outgrowth of conditions in the leading industrial nations. The United States, Japan, and Germany exemplified perhaps most completely the industrial development which characterized the latter years of the nineteenth century; and because of their relative industrial progress these countries, naturally, were looking increasingly for opportunities to expand, either through colonization or the enlargement of foreign trade and investments. And as a further consequence, toward the end of this period, it became necessary also for the surplus capital of other countries, which had contributed to this industrial growth, to seek opportunities in new areas.

This combination of events is a repetition of a familiar experience. Once intensive industrial development is under way it often carries a nation past the point of best distribution of productive factors, with a consequent disturbance of the equilibrium of industrial forces. Not until the point of best adjustment is past are the industrial leaders brought to a realization of the need for readjustment. But always the remedy for relatively over-intensive development lies, not in contraction, but in expansion. Additional supplies of raw materials must be obtained and new markets for finished goods developed.

The war has increased the industrial capacity of the belligerent nations and quickened the spirit of adventure in man, as well as his resourcefulness and inventiveness. In other words, it has created conditions which will induce men to get out into new regions. Therefore, we may expect a rather earlier development of the hinterlands of the world than would normally have come.

Our financial and industrial leaders are now confronted with the problems incident to the readjustment of industry to a peace basis. The difficulties of the present task will be lightened and the strength of our industrial fabric increased if our leaders keep in mind the long-term development of world enterprise, which promises a period of almost unparalleled opportunities for the profitable expansion of business.

### Readjustment of Business.

The question of readjustment of business to new conditions is of the widest immediate importance. Those who have considered this hold to the view that the government has the business welfare of the country in its keeping during the next twelve months. A policy of gradual cancellation of orders will, it is thought, afford the best assurance that business will not be subjected to a quick and disturbing strain.

### Factories on War Work.

The principal manufacturing industries are engaged in the production of the things needed in war. Factories have been accommodated to this line of activity and wages are being paid on a level induced by war conditions. With the war ended, there will be a reversal. High prices will gradually disappear, and with the return of soldiers there will be two men looking for one job instead of two jobs looking for one man.

The factories that have been changed to meet the government needs must be changed back. The question of lower wages must be discussed when profits fall and activities are lessened.

The people of the country have raised $17,000,000,000 through the sale of bonds and stand to raise from taxes $8,000,000,000 more, in addition to between $3,000,000,000 and $4,000,000,000 raised in 1917. It is thought that since the entire people have contributed these sums, and since the country as a whole will be most prosperous under gradual readjustment, the government should consider the application of some of these resources toward stabilizing business conditions.

### America's Position Peerless.

To any one who cares to make a casual survey of the world's situation, the position of the United States stands almost peerless in comparison with the other nations that have been at war. In the three years prior to 1918 this country accumulated the surplus of gold available from government channels of allied belligerent countries. In all, there was imported about $1,000,000,000. The so-called inflation, which amounts to between $2,000,000,000 and $2,500,000,000 in currency, has a larger percentage of gold as security than before war with Germany was declared. With more money, more men, and probably more merchant ships than any one competitor, the United States stands, in the end, to successfully meet all international conditions.

### Foreign Trade.

Rehabilitation of the industrial districts of invaded France and Belgium will require a vast amount of construction, including the building of dams, and also the erection of power plants and the general applica-

# *Views and Comments on Problems of Recon-*

tion of electric power. Electricity is the one thing capable, because of its flexibility and unlimited power of expansion, of handling the complex problems which will arise in connection with the reopening of workshops, factories and mines, and the resumption of social life in general.

The directors and representatives of the large central power stations and electric-lighting plants situated in the invaded regions, banded together under the auspices of the Syndicate Profession des Producteurs et Distributeurs d'Energie Electrique, are already engaged in studying the problem of reconstructing their central power stations. They have marked out the broad outlines of their plan as follows:

Those interested, as a technical committee, have been brought together in the "Comptoir Central d'Achats Industriels pour les Regions Envahies," 50 Rue du Colisse, Paris, under the Comptoir Central. The data in the possession of this committee indicate that the power stations existing in the regions occupied by the enemy represented electrical energy, including units in process of installation, that did not fall far short of 300,000 kw. From the information gathered by the committee, it is evident that in the immense majority of cases the electrical machinery, boilers, transmission lines, and in many cases the buildings themselves have been destroyed. There is, therefore, the necessity for replacing practically the whole electric-generating installation in the invaded regions. However, in order to avoid, on the one hand, undertaking a program which would be too ambitious and which would attempt to re-establish at one stroke the electrical situation as it existed before the war, while, as a matter of fact, the reconstruction of the invaded regions will without doubt demand several years, and to avoid, on the other hand, adopting a program so restricted as to cause cruel disappointments to those interested, the electrical committee has agreed to limit its plans, for the time being at least, to the restoration of one-third of the energy of the period before the war. This involves the restoration of 100,000 kw.

Those interested have agreed that since they will undoubtedly find themselves face to face with a clean slate so far as the old plants are concerned, advantage should be taken of the opportunity for securing as largely as possible the standardization of new equipment and transmission systems. The adoption of this principle of standardization would make it possible for those interested to help one another most effectively, because the machinery available would be capable of being used in one place as well as another and could be transported from point to point. The adoption of this principle of standardization would also permit the manufacture of the electrical equipment in series, which would naturally result in lowering the net selling price. It is true this process of standardization would impose sacrifices on certain of the electrical societies interested, but nevertheless they have not hesitated, in the interest of the invaded regions as a whole, to adopt a single type of generating apparatus. It will be a turbo-alternator group of 5000 kw. supplying 3-phase current at 50 cycles per second at 10,500 volts.

In order to develop as quickly as possible the desired energy of 100,000 kw. it would be necessary to provide for the installation of 20 identical sets, such as were mentioned, each one equipped with its own boiler plant, switchboards and distribution lines, with the necessary transformers and distributing apparatus.

An important question is, where will these new generating units be installed? The object in view being to furnish electric current in the invaded regions as speedily as any part of them has been liberated, it seems obvious that the first equipment would have to be installed in temporary central stations. These temporary stations would in some cases be designed to reinforce central stations already in operation on this side of the firing line. A part of the new installation will perhaps be left in reserve in order to be ready for installation in strategic locations in the regions still occupied by the enemy the moment their liberation has been brought about. These locations, naturally, cannot be fixed definitely at this moment; they depend upon future events.

Another question to be answered is, how will the electric current be distributed? Will it be by the new units that are in contemplation or will it be by existing transmission systems that may eventually be recovered? The object, of course, will be to satisfy the

## BRIDGING THE GAP.

By Bernard M. Baruch,
*Chairman War Industries Board.*

The War Industries Board will be the bridge whereby the industrial resources of the United States, which have been tied up in the war program of the nation, are to be carried back to a peace basis and rapidly diverted to the normal needs of industry and trade.

While it has never been the function of the War Industries Board to make contracts and while, therefore, the War Industries Board cannot assume responsibility for any of the financial adjustments with contractors incidental to cancellations, the board will undertake by advice and recommendation to so control the situation as to stabilize the flow of materials, labor and plant facilities back to peace channels.

Act as Clearing House.

To this end, the facilities section of the war industries board will act as the clearing house of all information relating to contract adjustment. It will receive information concerning contracts to be cancelled from the various departments of the government, and through the various commodity sections of the board keep in constant contact with the various industries.

At all times will there be contact maintained with the labor department also so that as labor is released from the war industries by contract cancellations immediate demand for its services can be located elsewhere. Bearing in mind the fact that for some time to come there must be continued those parts of the war program necessary to maintain the existing military establishment here and abroad, it will be likewise a function of the facilities section to divert, where possible, the materials, labor and facilities, released by one department, to the requirements of another department.

# *struction Era Affecting the Electrical Industry*

collective needs of the liberated regions as effectively as possible. In spite of the uncertainty with regard to the conditions in which the liberation of the invaded territory will be brought about, it is absolutely necessary to provide for the most effective distribution of current, no matter what locations may be chosen for the generation of the current. In this connection the electrical committee thinks it much better to leave out of consideration the old transmission lines, for the chances are that all the copper wire has been either destroyed or carried off by the enemy. Moreover, even if part of the old transmission system should be found intact, it would probably not be capable of use. For one thing, the old lines were arranged for supplying local commodities and were not designed with the object of tying up in one system the various zones requiring electric current on the basis of the proposed new central stations. Undoubtedly the old transmission lines would not be of much use in meeting the need of the future. It is wiser, therefore, not to place any reliance upon their utilization. On the other hand, the new lines that must be constructed in order to assure the proper distribution of current can not be determined without taking into account the distribution of current before the war.

To aid in solving this particular problem there has already been worked out a map showing the distribution lines existing in 1914. In addition a new map has been prepared, indicating in a general way the transmission lines that will be necessary for the distribution of energy in the invaded regions after the war. The provisional and theoretical transmission lines that have thus been sketched out have been developed purely from the point of view of the general French and Belgian public interests. No account has been taken of the more restricted interests of electric companies themselves and their individual consumers. The transmission lines contemplated by the committee have been classified in various categories according to the urgency of their installation.

By the creation of a vast system of power generation and distribution established in accordance with a general plan carefully laid out (largely with the help of American engineers) and capable of realization by successive stages as the needs of the invaded regions may dictate, the committee hopes to achieve the maximum efficiency by avoiding the creation of numerous small private central stations, which for the most part are not economical. Moreover, the scientific use of fuel in the projected large central stations will prevent the waste of coal that it is impossible to eliminate in small installations, and in this again American projects now under consideration in the United States have been taken as a guide.

The French and Belgian authorities are depending both on imports of American construction equipment and material and on the work of the American engineers to carry out this great work, which will begin as soon as the territory has been fully reclaimed from the enemy.

The problems of the reconstruction era are varied and must be studied by the whole people. The prime requisite is that we keep cool in face of the new conditions. This warning was expressed in an admirable manner by Lucius E. Teeter, president of the Chicago Association of Commerce, who said:

"Our first duty as Americans is to keep cool in the face of our new conditions. The next duty is to retain sight of our individual responsibility, each unselfishly lending his aid to the change of conditions.

"Every one must understand the change when peace comes is not to be sudden. War industry mills will not shut down over night without notice and leave all our workmen out of jobs.

"As to industry itself, one should recall that manufacturers of staple products now need large numbers of employes; that factories which were turned into war work can be turned back as easily; and, most important, that ordinary manufacture having stopped for months, while munitions were made, there is a lot of stock to be made in regular lines.

"People have learned during this war to spend more money—for their clothes, food, pleasure, every phase of life. They have become accustomed to living on a more expensive plane. They will continue to do so.

"Some are going to be inconvenienced by the change back, and it will be a slow process. But to what degree inconvenience comes depends upon how the whole nation pitches into the problem."

## GUARD AGAINST ECONOMIC DEPRESSION

By E. H. Gary,
*Chairman, United States Steel Corporation.*

If all business men recognize conditions and conduct their different lines so as to adjust the questions of supply and demand on a legitimate basis, all will be benefited and may look forward with confidence. Upon a careful survey of the situation, it will be found there are many reasons for believing prosperity in this country should be continued. The United States is richest of all countries. If industry is protected and fostered in accordance with its merit, the war burdens surely, even though gradually, will be lifted.

And judging the future by the experience of the last few years, there will be a disposition on the part of those in authority to assist rather than to attack business effort. There will be study, reflection, friendly concern shown in relation to the needs and requests of enterprise and investment. Legislation and administration will be founded on ascertained conditions, deficiencies and requirements. Both capital and labor will be protected and rewarded. Employers will lead in the effort to promote the welfare of their workmen.

Co-operation will be seen on every hand. Capital and labor will continue to co-operate with governmental administration, and the latter will reciprocate in every practical and proper manner. This spirit has been exhibited in a marked degree in this country and other countries during the last four years, and its benefits have been demonstrated so clearly that they will not permit a return to the methods of destructive competition.

As a general proposition it is still true that the optimist who keeps within the limits of cash or stable cash resources will succeed. For the long future we have reason to believe that the country will be more progressive and more prosperous than ever before.

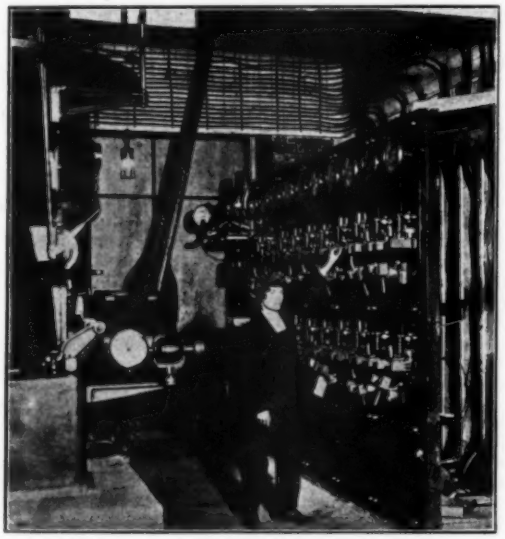
# Labor Readjustment in the Electrical Industry

## *Labor Problems of Electrical Companies—Prospects for Additional Business and Need for More Help—Where Help May Come From —Minimizing the Labor Turnover—Special Vocational Training*

Labor readjustment is one of the most difficult problems confronting practically all industries. During the war serious labor shortage was experienced in nearly all lines and many expedients were resorted to in order to keep the wheels of industry going at an accelerated rate in spite of this great handicap. Among the first questions arising, therefore, are: Will the demand for labor continue as heavy as it has been during the past year or so? Will the supply be equal to the demand or in excess of it? Will room be found for the returning soldiers and sailors in their former industrial positions? What will be done with the workers who flocked to munition plants and who are already or soon will be jobless? Will the women, boys and older men who filled the vacancies during the war be suddenly dismissed? To add to the difficulties of the situation is the uncertain attitude of labor as to compensation and hours of work.

These matters are arousing no little concern among employers of labor on a large scale. The subject is being given careful thought and study by employment managers of large industrial companies as well as by the Government Departments of Labor, War and the Interior. Certain plans have already been proposed, especially for taking care of returning soldiers, but no comprehensive solution taking into account all angles of the problem has been worked out, so that we are almost as unprepared for peace as we were for war.

In some industries the problem is much more acute than in others. It is believed that the electrical industry is somewhat favored in this respect and that its labor situation is, on the whole, quite hopeful. There are numerous reasons for this, the chief of which will be discussed below.



**LABOR NEEDS OF A BIG INDUSTRY.**

Following a period of difficult labor problems involved in meeting unusual production with reduced forces, we are now confronted with other problems in this line in readjusting organizations to the needs of peace production. Our labor problems have not been so serious as those of our Allies, who, as shown in the picture above, have had to operate many of their power houses and substations, as well as electrical manufacturing plants, with women. But among the uncertainties of the reconstruction period are the questions, to what extent will labor readjustment be necessary and how will it be effected?

Answers to these questions are offered herewith. Of course, no one can predict just what the business conditions will be, nor exactly what demand and supply of labor is likely to develop. Careful study of the situation shows certain definite tendencies, however, and solutions that seem logical. These point to a very hopeful prospect for the electrical industry in general as regards volume of business and indicate that its labor readjustment will not be any more and perhaps not as difficult as it was to adapt it to war requirements.

### Electrical Business Outlook and Need for More Labor.

All indications point to heavy prospective business in the electrical industry. Removal of war restrictions from construction will result in a big revival of building for residential, industrial, municipal and miscellaneous purposes; remodeling of existing buildings will also be resumed. All this, together with replenishing of depleted stocks of electrical supplies, appliances, etc., will create heavy demands on manufacturers, jobbers, contractors and dealers for the supply of wire and wiring devices, motors, appliances, etc., and for their installation. Increased foreign trade will add to the demands. Central stations will be called on to supply deferred loads for commercial and industrial plants, as well as for additional residence service. Electric railways and telephone companies will be confronted with additional traffic.

There is no reason to believe that any branch of the industry will not at least maintain the gross amount of business it has had during the war. In some quarters an unprecedented prosperity is foreseen. In all likelihood, electrical business will increase considerably and to handle it additional help will be needed. Electric utility, manufacturing and other companies have been struggling along with forces reduced by enlistments and the draft; many men, in the East especially, left for work in shipyards and munition plants. The companies have been and still are therefore short-handed

and running with too little margin for emergencies or rush work. To handle the additional business will require many additional hands, in spite of desperate efforts to operate at higher labor efficiency.

### Sources of Additional Labor.

Where is this additional labor to come from? The chief sources will probably be from returning soldiers, from men and women leaving the war industries gradually closing down, and from boys reaching the employment age. The prospects of renewed immigration are too uncertain to be counted on.

Conflicting statements have appeared as to when and in what increments our men in arms will be returned from "over there," but the period of time may be extended to as much as a year or even more, depending on how soon conditions in Europe become stabilized. Relatively few of the 2,200,000 men will be returned before next spring. It will be almost a physical impossibility to return them at a rate exceeding about 300,000 a month. Quite a number of the men in American camps will be returned in a short time, however. It is believed to be the policy of the War Department to return all men to civil pursuits as rapidly as possible, preferably to their old positions where these are promised them by former employers, or to as good or better positions. Options will be offered to them to remain in the regular army, if they desire, or to settle on public land that will be placed at their disposal. Likewise, the sailors will in doubtless large numbers, re-enlist in the navy or in our new merchant marine.

Practically all electrical companies have publicly offered to take back former employes returning from the nation's service. But of each 100 men that left to join the colors by no means will anywhere near that number return to claim their old jobs. Many a heroic lad has made his supreme sacrifice and is resting under foreign soil or the waves of the deep. Of the brave men wounded it is hoped to return over 90% fit for self-support, either in their former occupations or in such as they can be trained for; extraordinary efforts are being made by almost miraculous surgical skill to restore even the most terribly crippled to normal human shape. Many of the men will re-enlist in the army or navy or take up farming or some other pursuit for which they will have taken a liking. On the other hand, a considerable number of the boys in the Signal Corps who had no previous electrical experience will be glad to take up electrical work permanently.

Demobilization of the strict war industries will restore many skilled electrical workers for resuming their work with contractors as these again become busy, or with line construction or maintenance crews of utility companies. Of the women engaged in these industries a large percentage will probably return to domestic service or the purely feminine trades from which they came; another large percentage will retire from the employment field, marry returning soldiers or rejoin soldier husbands; still another percentage of uncertain magnitude will go into other industries where they will continue to substitute for positions formerly held by men; the electrical manufacturing industry will doubtless get part of this number.

Another source of recruits to the electrical industry is the boys coming of age to seek employment. The fascination for things electrical always attracts a considerable proportion of these enthusiastic youths, which fact has helped make the industry largely one of young alert men.

Taking it all in all, the foregoing sources will without doubt furnish abundant labor supply for the electrical industry to draw on so as to permit building up organizations of abundant size and competent character to handle the anticipated increase of business.

### Shall Present Emergency Personnel Be Dismissed?

To meet the heavy demands of the war coincident with greatly depleted forces it has been necessary to fill up the gaps by promotion from lower ranks and in turn fill these vacancies by new employes. The latter have included boys, older men, and in some branches of electrical work (chiefly manufacturing and office work) considerable numbers of women and girls. The emergency did not permit these new employes to be selected or trained with such great care as usual, so that in some cases misfits and incompetents gave a rather poor reputation to the new personnel. On the whole, however, the work has been carried on quite well, the new hands proving industrious, eager to learn their tasks, and loyal in nearly all cases where a preliminary period of training and observation could be set aside before placing the newcomer in a position suited to his or her capabilities the results have proven very satisfactory to all concerned. This experience, noticed very markedly in the case of munition and other war plants, has emphasized the need of careful selection and training so as to get the best results from new employés.

The question as to the retaining of emergency help resolves itself largely into one of supply and demand. If the demand is greater than the supply of more or less experienced and trained prospective applicants, the emergency personnel will be retained with little change. Should the supply be greater than the demand, the result will evidently be at least a weeding out of the less competent or misplaced among the emergency employes. There is this caution, however, that employers as usual will exercise: excessive labor turnover is always a detriment to an organization, consequently it is to be expected that only the disqualified will be dismissed where it is necessary to carry out the promise to re-employ returning soldiers.

### Special Training and Educational Work.

Central stations, telephone, electric railway and the larger electrical manufacturing companies have long realized the importance of special training courses for fitting new employes for their special work and occasionally also for preparing others for promotion. Many of these courses were seriously interfered with by stress of war conditions, which accounted for disappointing results in numerous cases. It is expected that these courses will now be resumed and others started. Considerable range in scope is to be found in this educational work in different establishments. In some it is merely a short training for a special job; in others it includes elementary studies usually taught in schools but which were poorly learned or missed by early leaving of school; in still others a background of necessary technical knowledge is included. This educational work should be as comprehensive as possible, but always adapted to the caliber of the student employes. A judiciously planned and conducted course pays.

As an outcome of the war specialized vocational training courses are being given to crippled or disabled soldiers to fit them for occupations wherein their handicaps do not count. Dr. Wheeler has very

successfully taught blind soldiers the work of armature winding at the Crocker-Wheeler works. An accompanying illustration shows French crippled soldiers being taught soldering. The experience of British and French electrical companies in these lines is valuable to those in this country in adapting those poor fellows for continued useful service to society and avoidance of having to appeal to charity.

There are now scattered throughout the country scores of technical colleges and schools that give three or four-year courses in electrical engineering. The great bulk of the electrical graduates of these schools find employment in the various branches of the electrical industry, wherein, as a rule, they rise quite rapidly to positions of importance in the engineering work and not infrequently to positions of executive responsibility. The war has emphasized the importance of the engineer and enhanced his standing. It is to be expected, therefore, that there will be an increased influx of new students to these schools. For the time being, however, their output of graduates has fallen off and the number of upper classmen has also been reduced by the war, so that the industry will not be

Teaching French Crippled Soldiers to Work at Soldering Bench, Where Their Disabilities Do Not Handicap Them.

able for a few years to get its usual number of embryo engineers from this source.

Where a large electrical company is unable to get enough trained young men, the only alternative is the setting up in its own organization of courses for training at least those of the brighter new men taken on that give promise of developing into permanent useful employes. Such a training should be reasonably complete not only for the special task in hand, but, if possible, in the general principles involved in the particular branch of the electrical business. A training of this broader character will be found very effective.

Where a company is too small to undertake training of this kind, it is often possible to encourage bright and enterprising employes to take up a high-grade correspondence course on electrical subjects. Great care should be exercised in recommending only a reliable correspondence school and from time to time the student should be shown some interest and given assistance in his studies to overcome the discouragement so commonly met in correspondence work.

A cause for prolific mistakes and inferior work in both small and large organizations is the fact that so large a part of the employes have no conception of what their work is for, how it fits in with the work of other employes and how the co-operative work of the entire organization is needed to turn out products or service of value to the community. When an employe

Women Have Been Found to Take Up Readily the Light Work in Electrical Factories with Cheerful Workrooms.

is engaged on apparently aimless work, it is not surprising that little interest will be shown in it. Heretofore, many employers have felt that it was impractical to inform their workers on anything more than the bare outline on what they should do in their particular jobs; in fact, it was often expected that they should instinctively know their work or first learn it in the plant of a competitor. Fear was frequently felt that too much knowledge of the work would give employes an exaggerated idea of its importance and consequently cause them to insist on excessive compensation.

Progressive electrical companies that have followed out both policies find that this fear is groundless, if the information imparted is prepared with care and is presented so as to stimulate the interest of the worker and at least give him or her some idea of what the work is for, so that his or her service can be rendered in an intelligent manner. Further, it frequently provokes the employe to become so interested in the work and product developed that it results in the bringing forth of valuable improvements in methods or construction and always makes the worker at least a better employe. Where fair treatment and reasonable amount of employes' welfare work is included in the plan of taking the workers into the confidence of the employer, the employes develop loyalty to and pride in the concern so that the problem of labor turnover practically solves itself.

Women at Work in a Canadian Wire Factory—Extensive Additions of Women in Electrical Factories Will Probably Remain.

# Readjustment Plans of War Industries Board

## *Electrical and Power Equipment Section Issues Statement as of November 14th Explaining Post-War Functions of Board*

The Electrical and Power-Equipment Section of the War Industries Board has just issued Bulletin No. 1 dealing in a preliminary way with readjustment plans. The full text is as follows:

We recognize that every officer of every corporation will be exceedingly anxious to receive as promptly as possible advice as to plans and are therefore proposing to issue a bulletin to you weekly, or even daily, as we are able to convey anything of a definite nature.

**Full Text of Bulletin No. 1 of Electrical and Power-Equipment Section, War Industries Board, Dealing with Readjustments**

GENERAL.

Mr. Baruch has been busy night and day in conference with the heads of other emergency war agencies and with regular Cabinet members in working out definite plans and relations for functions to be performed by each division with reference to its own affairs, so that there may be a consistent policy for all agencies, and with reference to matters overlapping or concerning two or more of the agencies. In his session with us Nov. 13, he advised that whereas industry has uniformly, with sacrifice to itself quite irrespective of the degree of hardship, fully supported the war and the controls and restrictions that have been instituted by the War Industries Board, it now becomes the duty of the War Industries Board to assist wherever they properly can industry in its problems.

AUTHORITY.

The authority of the War Industries Board will be automatically cancelled upon declaration of peace as distinguished from the signing of the armistice. It will continue its functions in assisting the Government agencies in all tapering off programs in the same manner as it assisted the agencies in building up production and in the conversion of industry as long as it may be useful or until the signing of the treaty of peace. In the production program the authority for making contracts lay entirely with the government departments. The War Industries Board advised as to the distribution of those contracts but could not undertake responsibility of deciding whether or not contracts should be placed at all. The War Industries Board similarly will not now possess responsibility for tapering down wherever it is found necessary but probably will be called upon to advise in similar manner, as to distribution of any cancellation. Mr. Baruch has expressed the principle that responsibility must be accompanied with final power to act. Likewise, final authorty as to action must be accompanied bv responsibility. The process of tapering down now seems to be accompanied by a greater degree of responsibility than was incurred when contracts were being placed. For this reason he asks us all to be patient and to urge our industries to be patient, recognizing that it is the desire to withhold all action, if possible, until clear policy for all industry can be worked out.

Many divisions have under way valuable standardization and conservation programs. So long as the war lasted, we felt we had not only justification but authority to bring these programs to consummation. Although we are still technically at war, we feel that since we are only technically at war, we have lost our authority and will attempt to bring to final completion and publication standardization and conservation schedules only upon request of the industry through their war service committees. Those of you who have been serving as members of group committees in consultation here should therefore, by mail or in actual meeting, conclude for yourselves whether you desire to have programs you had tentatively prepared promulgated. If so, the War Industries Board will be glad to do so even at this late date as a recommendation to industry. We feel we cannot go further at this time than merely to make the recommendation. The Army have advised that they propose to go right ahead with the Army standardization and your group committees should continue work with them. The distinction we now wish to make, therefore, is the one whether we should recommend that such standardization as has already been effected with the Army shall be promulgated as a recommendation of general standardization.

CONTROLLED INDUSTRIES.

Release of control is to be arranged in the same channel as the control was applied. A recommendation to be submitted and if approved by the Board members, notification of release will go out in the same manner as notification of control. Each war service committee of an industry now under control will please, therefore, immediately advise whether they desire to have us recommend that control be released. This should be without regard to the automatic priority now enjoyed which we cover below.

PRIORITIES AND RESTRICTIONS.

No release of priority has as yet been granted. Much energy, however, is being devoted to the subject with a view to easing from war to peace basis with a minimum of difficulty. There will, of course, be tapering down of many classes of production, such, for instance, as gas masks, as it may possibly be presumed that a League of Nations if formed will see to it that Hague conventions are enforced in future so that there will be no need of such equipment. The idea is expressed at this time that some protection may be offered to even such projects as distinguished from a policy of ruthless cancellation, though no definite conclusion has yet been reached.

Under priority classification and in connection with the Priorities Division we have had voluntary agreements with you as to the nonacceptance of business not in any way related to the war. You are hereby

partially released from that phase of your pledge according to the following qualifications:

(a) In accepting orders of the class heretofore forbidden under this voluntary agreement, such acceptances should be subject to prior delivery of what is essential to that part of our war program which will be carried out, and should also be accepted for secondary consideration as compared with demands incident to reconstruction, which will probably shortly commence to appear. It is due to this last possibility from the point of view of the Allies that the War Industries Board is still holding some measure of restriction on the curtailed industries, and, still further, we may hold some restraint until not only the demands for reconstruction from the Allies can be obtained, but until we can also co-ordinate the relations between dovetailed industries, if it should be found necessary.

(b) Restrictions in output were placed upon certain branches and commodities. If the curtailment was 20%, it is now released to 10%; if it was 40%, it is now released to 20%. You are authorized, therefore, to accept orders even on the curtailed industries, though they may be of an entirely nonessential character, up to that basis.

(c) Delivery, however, must for the present be restricted to such orders

1—as are covered by specific or automatic priorities;

2—as are authorized by circulars or permits as have heretofore been issued by the Priorities Division;

3—as may be authorized by circulars or permits issued hereafter by the Priorities Division, such as Circular No. 57 enclosed herewith;

4—or for purposes or firms embraced within Preference List No. 2.

We suggest that it is perfectly proper for you to solicit business of any and all classes subject only to reservation that you are not as yet advised as to when production may be undertaken. It is expected that further suggestions or releases will be offered quickly. If so, we will undertake prompt advices, which is one of the purposes of this series of bulletins.

### Monthly Reports.

It is our idea at the moment that these will probably be released after those of December 1 shall have been made. We ask you not to release your own machinery for preparation of these reports at this time, relying upon us to release you just as soon as we are sure their usefulness is past and that there would be no need of returning to any substitute system. This applies to the industries administered by this section which have been under the monthly report form system.

### Individual Problems.

Let us remind you that under this Section we have been handling stokers, boilers, piping and fittings, engines, compressors, motors, dynamos, supplies, etc., and that we are writing these bulletins from the point of view of all, or any. Probably much of what we shall have to say will not apply to all. You will also understand that the idea is simply an attempt to convey to you as rapidly as possible conclusions as they are reached here and to, so far as possible, anticipate your questions.

### Exports.

No release at this moment has been granted and possibly will not be until it can be determined just what ships can be diverted from transatlantic service to their normal service and just how much space will be available for European shipment for other than necessary supplies to our Army and policing force abroad, and for other necessities of life for the countries which are in such great distress. We will advise you just as soon as there is anything definite with reference to release on exports.

## GOVERNMENT HAMPERED BY FLOODS OF MAIL INQUIRIES.

Owing to the enormous increase of Government war and reconstruction work, the governmental departments at Washington are being flooded with letters of inquiry on every conceivable subject concerning the war and plans for reconstruction, and it has been found a physical impossibility for the clerks, though they number an army in themselves now, to give many of these letters proper attention and reply. There is published daily at Washington, under authority of and by direction of the President, a Government newspaper—*The Official U. S. Bulletin.* This newspaper prints every day all the more important rulings, decisions, regulations, proclamations, orders, awards of contracts, specifications, invitations, and bids as they are promulgated by the several departments and the many special committees and agencies now in operation at the national capital. This official journal is posted daily in every post office in the United States, more than 56,000 in number, and may also be found on file at all libraries, boards and chambers of commerce, the offices of mayors, governors, and other officials. By consulting these files most questions can be readily answered; there will be little necessity for letter writing; the unnecessary congestion of the mails will be appreciably relieved; the railroads will be called upon to move fewer correspondence sacks; and the mass of business that is piling up in the Government departments will be eased considerably. Hundreds of clerks now answering the correspondence will be enabled to give their time to essentially important work, and a fundamentally patriotic service will have been performed by the public in this way.

*The Official U. S. Bulletin* will be sent to any address by remitting the price of subscription to its office, 14th and H streets, N. W., Washington, D. C. The subscription is $5 per year. Firms making frequent reference to its files will find it advantageous to subscribe for the bulletin directly.

## CONTRACT BOARD TO ADJUST DISPUTES.

A board of contract adjustment has been constituted, by order of the secretary of war. The functions of this board are to hear and determine all claims, doubts, or disputes which may arise under any contract made by the war department. The board is clothed with all powers necessary and incident to the performance of its duties.

Through the operation of the board of contract adjustment, contractors supplying the army will be able to submit any differences that may arise between them and the contracting officers of the various supply bureaus to this board, which will act without any of the technicalities of court procedure thus insuring a speedy and equitable adjustment. The decisions of the board will be final and conclusive on all matters submitted to it for determination, but appeals may be made to the secretary of war.

# Reconstructing a Logical Program for Hydroelectric Development

## *Investigations of Water-Power Development to Relieve Power and Fuel Shortage—Salient Features of Logical Development Program*

The fuel shortage created during the war acted as a powerful stimulus to the conservation of coal and oil. The coincident power shortage in big industrial centers emphasized the importance of reserve power supply. Together, they showed the value of further hydroelectric development as a most effective means for conserving fuel and as an advantageous means for getting additional cheap power. Investigations of the power situation in several sections of the country were undertaken on behalf of the War Industries Board.

It was hoped that actual construction of some of these water-power plants would prove an object lesson to Congress of the great value and importance of hydroelectric development and thus accelerate the enactment of legislation favorable thereto. The signing of the armistice and the flood of reconstruction legislation may further delay congressional action on this matter. It will not be amiss, therefore, to refer to a typical investigation of this subject recently made on the Pacific Coast and then point out a few fundamental principles that should be included in constructive legislation to bring about these much needed developments.

The investigations concerning hydroelectric possibilities in central and northern California made within the last three months by Major Geo. F. Sever, special representative of the Power Section of the War Industries Board, are of vast importance to that state whether regarded in the light of a war necessity or as a provision for the requirements of industries after the war. These investigations by Major Sever, and his recommendations to the War Industries Board a month ago, showed the feasibility of adding over 100,000 kilowatts to the power output of the state by constructing additional hydroelectric plants as extra units in the several existing systems. In his opinion an increase of electric power to the amount stated could all be accomplished by the end of 1920, and much of it by the end of 1919. The financing of the proposed projects, as the plan is understood, originally contemplated the co-operation of the War Industries Board, the War Finance Corporation and the power companies. In this connection, it is understood, the appropriation of $200,000,000 provided for under the Sims bill had in view the financing of power projects, including those proposed in California.

Existing power shortage in California, originally computed on a war basis, was classified as follows: To supply the requirements of war industries, mostly on and in the vicinity of San Francisco Bay, 25,000 kw.; to supply general and miscellaneous industries, 25,000 kw.; to replace the load now being carried by the steam plants in which oil is used as fuel, 50,000 kw. The last-named classification takes cognizance of the increasing shortage of fuel oil if its consumption continues on the basis of war demands.

At all events, the data worked up by Major Sever will unquestionably serve as the basis for the increase of electric power production to the extent recommended, whether by Federal aid or solely by the power companies and by their own financing. His recommendations, based upon first-hand examinations, would require the expenditure of about $20,000,000 to provide facilities for an increased production of the 100,000 kilowatts or more estimated to be necessary to meet the existing power shortage in central and northern California.

Major Sever's investigations were extended to the water-power resources of the Hetch Hetchy, in Yosemite National Park, which is the source of the proposed additional water supply for the city of San Francisco; he also conducted investigations on possible further hydroelectric developments in southern California, which means south of the Tehachipa pass.

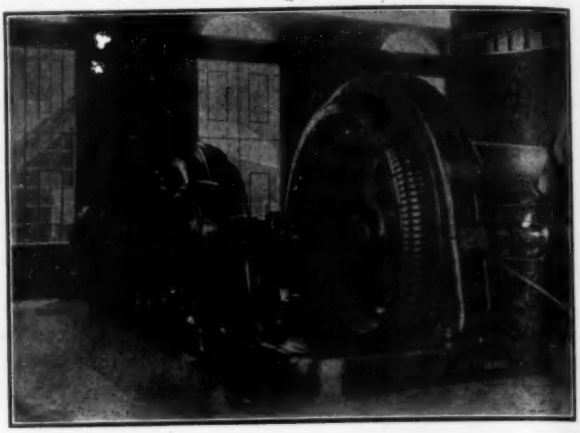
Similar investigations were made in other parts of the western states and in other sections of the country. Measures were worked out for relieving the power situation at Niagara Falls. In all these cases it was shown that there are numerous projects lying reasonably near power markets that could be developed or extended by the expenditure of moderate amounts of capital so as to yield considerably more power and save enormous volumes of fuel for districts where water power is entirely unavailable. The truce has checked early development of these projects by the aid of governmental agencies.

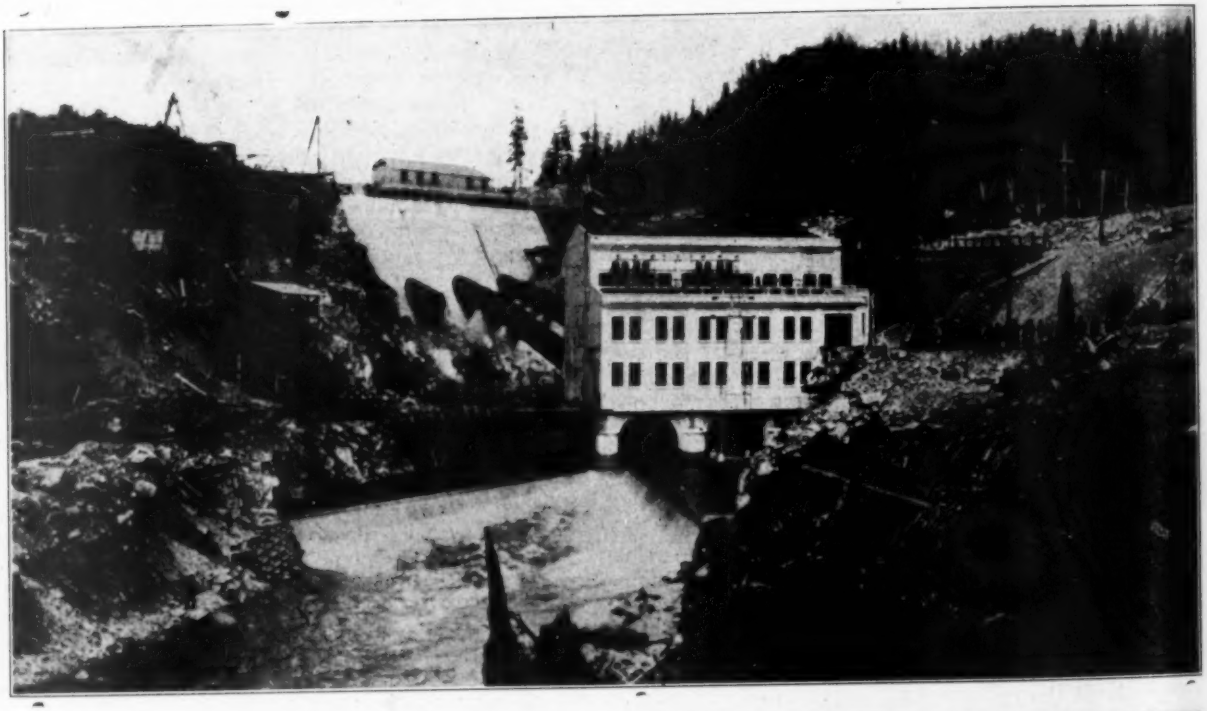
The lesson from all this is that Congress must realize it is grossly wasteful to allow our water powers to dissipate themselves over waterfalls and cascades while almost desperate efforts are being made to conserve fuel. Wise conservation of natural resources calls for prompt development of the water powers. We know enough from our extensive experience in this line to insure wise development from the engineering and economic standpoints. To make such a development most effective it should be interconnected with an extended electrical supply system so as to be able to run at practically full load at all hours of the day and every day of the year, fuel-burning stations being used chiefly for peak-load and standby service. From the financial standpoint it must be remembered that large capital expenditures are required for any water-power developments; the financing cannot be done if the grant is for a shorter term than 50 years and revocable at the arbitrary pleasure of any official.

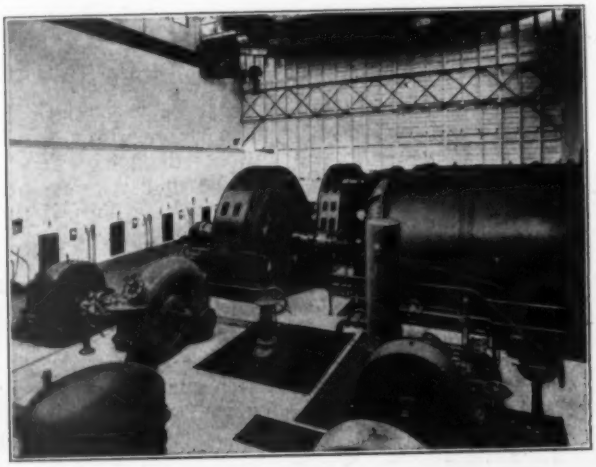
These important features must be recognized in any legislation aiming to promote water-power development. They are logical and based on experience. Even if the Government itself undertook the development, it would have to do so along these lines, if the most economical and effective development were sought free from imposing burdens by taxes. Any grant to a private power company can be supervised by a proper public service commission and rates and service regulated along well established lines of equitable utility regulation.

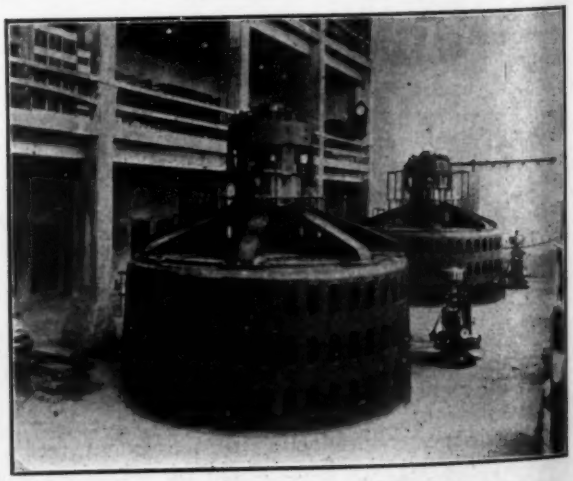
The rush of other legislation may retard early congressional action, but it should not prevent fair and definite action when that finally is taken, as it must be soon.

# *Views of Typical Hydroelectric Plants That Are*

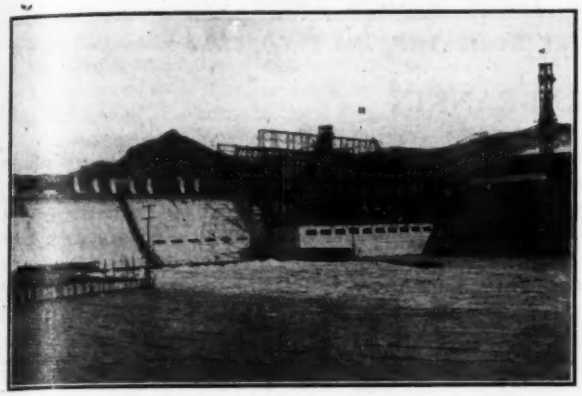


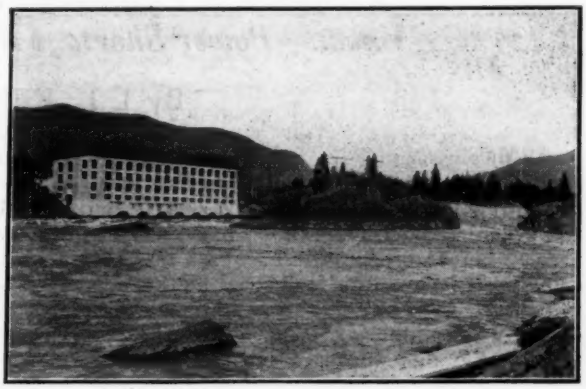


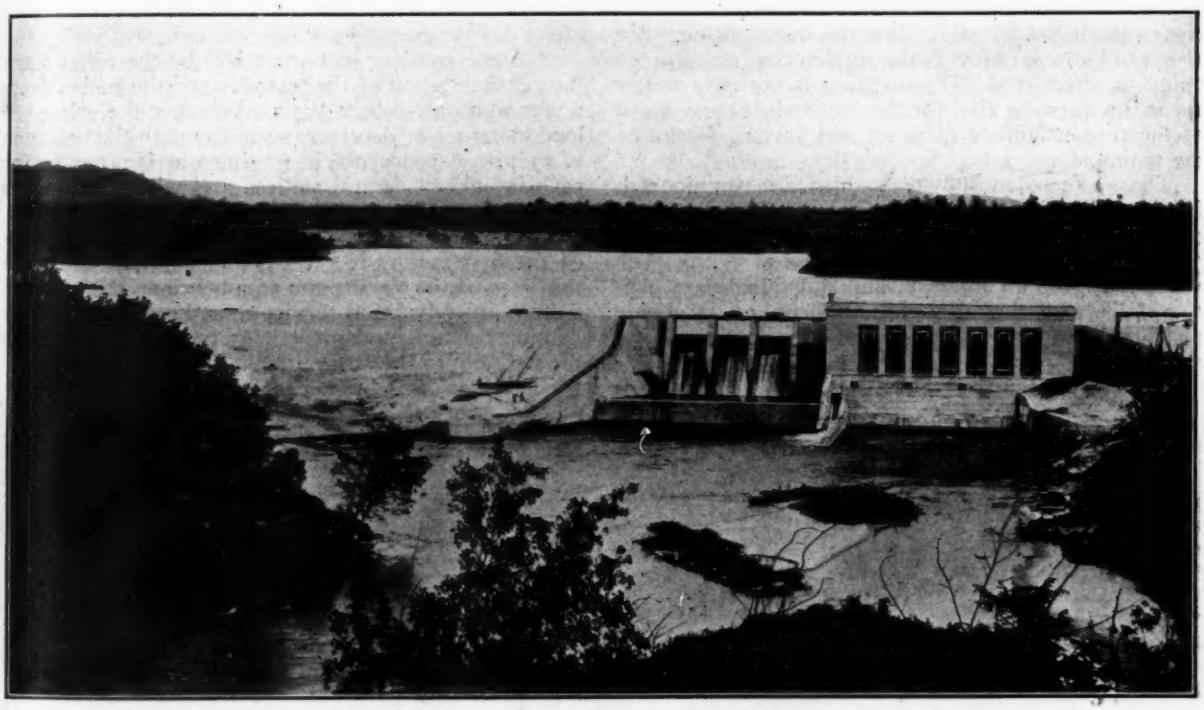


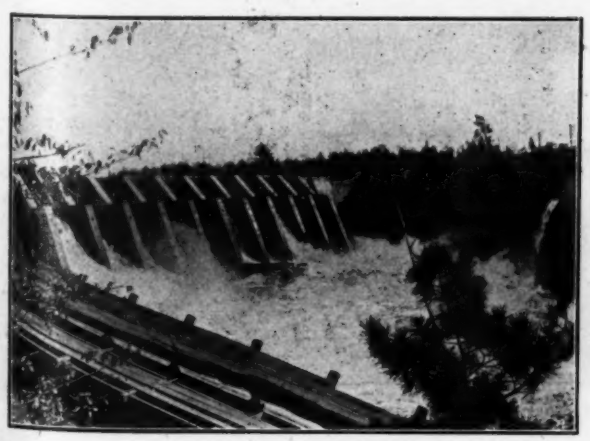


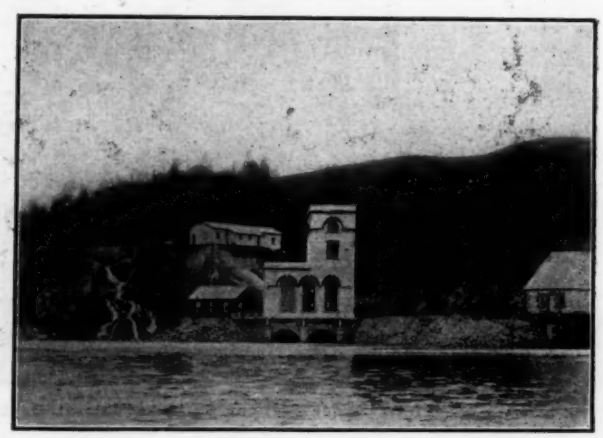
# *Conserving Fuel and Meeting Urgent Power Needs*











# Effect of Peace on the Central Stations

## *Transition from War to Peace Offers Opportunity to Rehabilitate Equipment and Make System Improvements—Power Shortage Rather than Surplus Expected*

By I. L. KENTISH-RANKIN

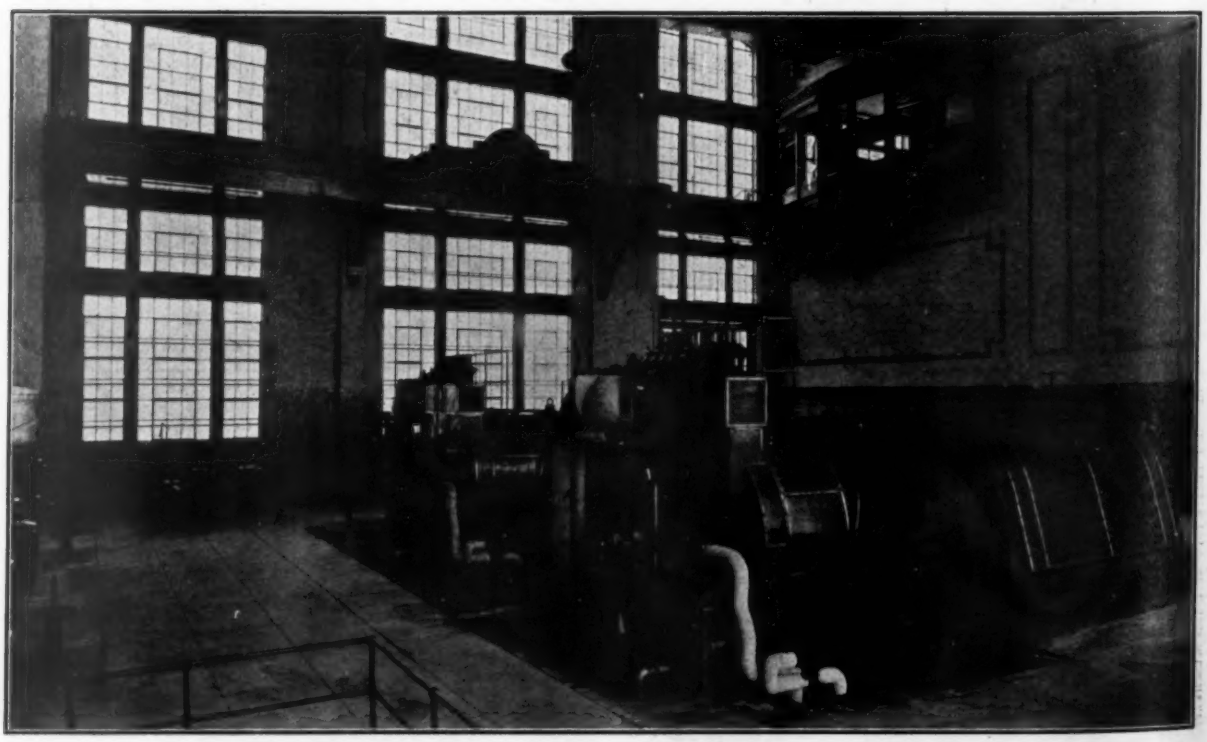
With the sudden cessation of hostilities came a rapid slowing down of the effort that had been put forth to winning the war. The post-bellum period, for which so much preparation had been planned, has arrived before preparation had been made; in fact, it came to find the nation industrial not expecting it. It is natural, therefore, where a nation is mobilized in every way—military, naval, industrial and domestic for the one supreme purpose of waging war, 100,000,000 people with one thought working under intense strain with intensive effort—that the sudden letting up of that effort must bring reaction.

How long a time must elapse before reaction arrives cannot yet be told. But the question everyone wants to know is: How is the sudden coming of peace going to affect me? The question is not only timely but it is a question vital for the successful achievement of the responsibilities of peace and for the future of the nation.

Those affected most by the sudden, almost unlooked-for cessation of hostilities in the industrial sense are engaged in the production of the materials of war that go directly into the maintenance of an army. And in varying degree all interests and individuals are concerned likewise, though perhaps indirectly, in the state of labor, of capital, of industry, of social and economic developments.

A large amount of central-station power has gone into the production of war material, what percentage may perhaps be known one of these days. However, with the curtailment on non-essential industries, and the exclusion of many of them, to give place to war industries, the munitions load has proved a welcome accessory to the central-station company. In many cases only those companies supplying strictly essential industries have been able to obtain equipment or their full requirements of fuel. In many cases large plant extensions have been made to care for the power requirements of war industries. The paramount question before the central-station company, therefore, today is: How will the cessation of war industries affect our income and our load curve?

No one can say just what will be the effect upon the central station of the transition of the nation from a war to a post-bellum basis. Whether the connected load increases or decreases seriously with the cessation of industries concerned in waging war is a matter for each individual central station, and will depend upon each individual central-station load. We do know, however, that just as central-station service was one of the first factors to receive consideration and to be put to work in placing the country upon a war basis, so too, central-station service must be one of the predominating and fundamental forces at work in getting the nation into the stride for the post-bellum days and the vast work that lies ahead.



**New Power Stations Such As This at Dayton Must Cultivate New Classes of Business.**

Public service corporations and utilities generally have now come to be recognized as one of the fundamentals of industrial and domestic life. Around them the very fabric of our national life is built up. With their healthy progress and prosperity, the prosperity and development of the community they serve are interwoven. Without the "readiness to serve" of the central stations many of the munitions industries and other industries that have contributed to the winning of the war could not have made the speed they have or sustained the output they did, were it not for the service rendered by the central station.

Allowing that a very real surplus of power becomes available, and such will undoubtedly be the case where capacity has been installed expressly for munitions supply, and the work ceases, attention must turn toward utilizing it. The situation for finding ways and means are extremely favorable for doing this. Many chemists, electrochemists and metallurgists will find their way from war work to peace work. New methods will be developed that will not only use up existing surplus power, but require additional power. The intensive effort put into winning the war will not entirely abate, but will go into research achievement and industry.

The central station may find it necessary to develop and cultivate new forms of load. On the other hand, it may mean going out after loads available but not accessible. By loads not accessible is understood loads that exist, in fact or potentially, but are not served by existing central-station lines of the company in question. For example, a neighboring utility may not have sufficient capacity to meet its needs and thus is unable to take all the load that offers itself; isolated plants may have loads in excess of capacity and want relief or stand-by service. In both these instances linking up of systems and the pooling of loads or capacity offers a possible solution with mutual benefit to those concerned.

Many industries have come to these shores since the commencement of the World War. Many of these industries will remain to grow until able to fill home consumption and extend to world markets. Much of the money made out of the war will be put to work to rehabilitate and enlarge existing plants and engage in new undertakings in anticipation of an export trade. Years will be required to build up what the war has destroyed. The balance of power, the status of commerce and the location of world markets have changed. Today only two first-class world powers are ready to prosecute a world trade—America and Great Britain. France must be rebuilt before she can go out into the world trade. Germany, with her indemnities, her disorganization and the greatest barrier of all—her lost reputation and prestige—cannot be considered for several years to come.

This nation is being called upon to meet demands similar in magnitude but different in character to those of winning the war. Nations that for more than four years have been deprived of luxuries and the bare necessities of life must be fed and replenished; centers of industry have been demolished and are now a mass of ruins; nations crushed down by war have become consumers where once they were producers. The demands of the steel mills, the requirements of the nation's ships and the insatiate appetite of Europe for food and clothes will keep many so-called essential industries busily at work for many months. Taken by and large, a shortage of power looms rather than a surplus, except in those localities where exclusive war work has been the condition.

Looking at the power situation as it appears in the cold light of fact, it seems that on the whole the demand for power will suffer only a temporary decrease while men, materials and capital become available for the work of reconstruction. With conditions as they appear to exist, one may suppose that the readjustment from a war to a peace basis will occur as smoothly and about at the same rate of speed as the change from a peace to a war basis.

The comparatively young but vastly important electrochemical industry is dependent upon the quantity and price of electric power. Today neither is there sufficient power nor is the price sufficiently low. The American electrochemical industry today faces not only the difficulties of the times, but may soon face the difficulty of keen competition that may come from Germanic trade methods camouflaged through neutral countries. Today the central stations in seeking to maintain and even improve their load-factors turn to the electrochemical industry as a promising solution for a large part of their problem.

Other factors beside cheap and ample power enter into this problem, of course—accessibility of markets, raw materials supply, etc.—but the field is an almost limitless one, as yet only in the beginning of exploration. The production of fertilizer and fixation of nitrogen may be expected to receive attention. The production of steel, ferro-alloys, abrasives, amorphous carbon and graphite are large consumers of power and industries already well founded. The electric furnace is also finding increasing use in brass and bronze melting, for pig iron and a large number of applications of industrial heating. There are in addition many products made by electrolysis that may be encouraged as being marketable products and useful consumers of energy.

Industrial electric heating and cooking represents a valuable load that is more easily cultivated and is more widely applicable than electrochemical loads. This form of load has high load-factor, although not usually as high or of the same magnitude as that of electrochemistry. The campaign of education to save coal makes the present time more than ordinarily favorable for industrial and domestic electric heating.

The motor truck and the transportation of freight over highways will find popular and powerful backing when automobile factories are able to turn to production again. But the eventual high cost of this form of haulage, the rapid wear and tear on mechanisms and roadway will handicap this mode of transport increasingly as its cost makes itself apparent with time. Meanwhile, it seems unreasonable to suppose that electric-traction interests will continue to stand by and restrict their efforts to the haulage of passengers without launching out to the handling of freight. The field is a large one; the consumption of power a matter worthy of the best central-station attention. The superiority of the trolley over the truck is also a matter that is closely allied with conservation and the cost of living.

Looking further ahead, railroad electrification of terminals and of dense sections of track may be expected to come as a direct result of the war. This will, however, be delayed in preference to more pressing undertakings, and until conditions have become more settled and the cost of labor and materials have become more stable at a lower level.

### Plant Conditions During War Time.

A very small margin of safety has existed in most plants during the last year or so; in many instances actual overloads have been carried during the entire

day. This condition could not go on indefinitely without mishaps and shutdowns. Stand-by capacity has been foregone, units have been kept in service although in urgent need of repair, cleaning and overhauling has had to be delayed although operating economy suffered, because capacity could not be spared, the direct result of heavy sustained loads and high load-factors. In other words, operation has not been compatible with safety to service and reliability.

For the last year at least, and in many localities for much longer, normal load increases resulting from domestic and industrial and what have now come to be called non-essential demands, have not been connected up. Lack of capacity, lack of material and labor, conservation of capital and resources have stood in the way in the interest of winning the war. War industries have had the right of way. Conditions are now changed. The load that would normally have been connected may now be taken on. But the load that would normally have come to central-station supply has been considerably augmented in many ways. Isolated plants have come over for emergency service entirely, or because of coal shortage; prosperity, war's profits and similar reasons have combined to increase the nominal normal load increases now awaiting connection when the industrial situation permits.

The rate at which the load awaiting connection can be taken on depends upon the rate at which the work can be carried on, in turn depending upon men and materials and capital. Here then a delay is to be expected, is in fact unavoidable, because a material and labor shortage must exist until conditions begin to become normal again. The lapse between the dwindling or perhaps cessation of the munitions and war industries load, and the taking on of the post-bellum load now awaiting connection will affect the central station. However, for those plants whose war-time load has represented a radical demand, the loss of load is not entirely to be regretted. In fact for many plants it may be a blessing in disguise.

### Rehabilitation of Power Plants.

It's the pace that kills. And this applies absolutely to machinery in general and electric apparatus in particular. The apparatus of many power plants has been subjected to extremely rough treatment continuously for the last year and more. Loads have been heavy, often considerably in excess of rating. These loads have been long sustained, resulting in higher operating temperatures than were advisable or even safe. Lack of capacity has necessitated keeping equipment in service when safety and the welfare of the apparatus itself and the service it supplied dictated shutdown and overhauling. A further factor tending to cause accelerated deterioration of apparatus has been the shortage of labor as well as time necessary for executing repairs in the short time available. These conditions spell deterioration.

Plants have been called upon to meet unprecedented demands made unexpectedly upon them. These loads were not occasional, but were sustained at load-factors extremely favorable for high return and economical operation provided plant capacity was sufficient. High load-factor, however, becomes less of an asset and more of a liability when it makes it impossible to take apparatus out of service for badly-needed repairs and cleaning. Reliability of service suffers, as does also efficiency of performance.

The lull in station output, the greater reserve capacity, the easing up in output will therefore be welcomed where overhauling has to be done and needed changes made. On the other hand, most power plants have been prevented from doing many things because of inability to obtain equipment. Power-plant betterment cannot yet go ahead until labor and materials become available, which means a considerable lapse of time must occur before the lessons learned by the war bear fruit. Although hostilities have ceased, many plants must continue to produce at full output for many months before orders on hand are filled. Many power plants who placed their orders a year ago have many months to wait before they obtain deliveries. Companies that have delayed ordering equipment will encounter further delay, during which time necessary capital can be obtained.

Power plants, central station and isolated plant alike, have learned lessons from the war. Conditions forced by circumstances will not revert to their former state. Power-plant improvement, better operating methods, and general betterment in the use of machines and men around the power plant have come out of circumstances created by the World War. "Splendid isolation" of central station and isolated plant has given place to interconnection, interchange of energy and load, and mutual operation to mutual advantage of all concerned. Coal saving was just getting under way when hostilities ceased. But it is felt the good work will still go on. Coal saving is largely a matter firstly of education, and secondly of appreciation, and coal saving then becomes a fact.

The value of preparedness is fresh in our minds. Central stations must now, while there is time, prepare for what is to come. The last year or two have been strenuous and difficult times in the central-station industry, but it would seem the years to come will be as strenuous, with the difference that what lies ahead is hardly in sight and is only commencing.

The average central station—at any rate, that whose war-industries load has not constituted its only or major load—feels that he strenuous months now past will come again. But before they come there will be a lull, a well-earned rest. And during the lull, the transition period during which conditions shape themselves into more permanent form, systems will be built up in anticipation—anticipation has never kept pace with central-station growth, it seems—of the prosperity that the next 10 to 20 years are thought to hold. Money will have to be raised, and the money market is tight at the present time; apparatus will have to be obtained and placed in service, and all of this takes time.

The need for co-operation and co-ordination of interests of the big and little concerns and the interests of the "people" is as great today as ever. The importance of conserving coal has not abated one whit. Ample power at low cost is needed at the present time as it was never needed before. The war's lessons must not be forgotten. The central-station industry has played a great and creditable and vital part in winning the World War, for the industries have hinged upon public-service supply in making almost everything that goes into the waging of war as it is waged today. But the central-station industry must yet play an even greater part in the reconstruction and rehabilitation of a world wrecked by modern war; it is basic in bringing about the resurrection and renaissance of the Old World devastated by an unscrupulous foe and laid waste by a nation bent on a war of bestiality and frightfulness. And in accomplishing this ample and cheap power is as important as in the waging of war.

# Electricity in the Cement Industry

## *General Information Regarding the Different Classes of Machinery Used and Sizes and Types of Motors Best Adapted for the Work—Part II. of a Paper Before A.I.E.E.*

By R. B. WILLIAMSON

The starting torque required for the Fairmount crusher when idle, is very low so that squirrel-cage motors are often used. While it is not possible to start the crusher full of stone even with slipring type induction motor, the latter will give sufficient torque to start up the crusher without entirely cleaning it out, if it should happen to stop under load. Slipring type motors are therefore, recommended for this class of work.

### Crushing Rolls.

The most favorable condition for crushing rolls is obtained when the ratio of size of feed to product does not exceed 4 to 1. When this ratio is exceeded, the efficiency of the roll is greatly decreased and an increase in the power required will be noted. With the ratio 4 to 1, the power requirement remains practically constant whether the reduction is from 4 in. to 1 in. or from 1 in. to ¼ in. The amount of material crushed, however, will be in proportion to the size, *i. e.*, when reducing from 4 in. to 1 in. the rolls will handle four times as much material as when reducing from 1 in. to ¼ in.; all other things such as size of rolls, speed, etc., remaining constant. Any increase or decrease in the speed of the rolls will increase or decrease the quantity handled and the power required.

As the starting conditions are not severe, the squirrel-cage induction motor makes a suitable machine for driving the rolls, provided the conditions are such that this type of motor is connected to a source of power where line disturbances are not objectionable. If line disturbances are objectionable, the slipring type of induction motor should be used When shutting down the mill, the usual procedure is to first cut off the feed to the rolls, allowing same to empty themselves, before closing down the motor. No difficulty, however, is likely to be experienced with the squirrel-cage type of motor, if called upon to start the rolls when full of material and with the feed open, as even under these conditions the starting requirement is not severe.

### Intermediate Crushers.

*Hammer Mills.* These machines are made in several styles but all make use of the same principle, namely, the use of hammers revolving at high speed and abrading the material against a slotted iron casing. Unlike the crushing rolls, where a reduction not exceeding 4 to 1 is most favorable, the hammer mill is used for reducing material of from 2½ to 1 in. to 20 mesh or less, the maximum reduction in this case being 76 to 1. As the power required to drive this type of mill varies considerably, due to irregularity in feed, it is most important that this remain steady and therefore a feed regulator is highly desirable. In addition to this, any variation in the size and hardness of material, provided the feed remains fairly constant, will also cause power fluctuations which will however be within reasonable limits.

A general rule gained by experience indicates that in order to crush one ton of dry limestone in one hour, reducing from a maximum size of 2½ in. to 20 mesh, requires six to seven horsepower. This would be the output of a motor and would include the friction load, in addition to the crushing load, of the mill. The actual capacity of any mill is proportional to the size of the product and to some extent to the character of the feed so that for different sizes of product on any given mill, the power requirements will be different.

*Universal Grinder* (Williams). This is termed a tube mill feeder as it will take limestone 2½ inches and under after passing through the dryers and reduce it to a product, 95% of which will pass a 20 mesh sieve. These are built in ten sizes, the two most commonly used in cement plants being the No. 3 and the No. 9. The No. 3 handles from 8 to 10 tons per hour under the above conditions, requires from 50 to 60 hp., and should operate at a speed of 1100 r.p.m. The No. 9 size, used in plants requiring very large units, handles from 25 to 30 tons per hour, requires 175 to 200 hp., and operates at a speed of 720 r.p.m. Wound rotor induction motors are the best application on all three mills. The preferred method of drive is by motor direct-connected through a flexible coupling.

*Sturtevant Rotary Crushers.* This type of rotary crusher operates on the principle of the old fashioned coffee mill. It is shaped like an hour-glass or double cone, one cone mounted and reversed on the other. The coarse material is introduced at the top and is acted upon by a rotating cylindrical member which exerts a continual nipping action on the rock since the diameter of the stationary cone decreases as the material falls toward the center. Below the center the material is ground or shredded by the usual mill stone action. The lower portion of the rotating member is cone-shaped and so arranged as to leave a tapering annular space decreasing in size toward the bottom. As the material proceeds by gravity toward the bottom, it is ground and reduced in the annular space by the action of the rotating cone against the stationary one. Both these members are faced with hardened steel burrs or grinding members. These crushers are intended for moderately hard or soft rocks but are not used for hard cutting substances. They crush large rocks to approximately ⅛ inch without screens in the smallest sizes and as coarse as 1 inch in other sizes. Their sizes, outputs and power requirements are as shown in Table 2.

TABLE 2.

Power Requirements of Rotary Crushers.

| Machine size. | Approx. capacity in tons per hour. | Rev. per min. | Approx. hp. |
|---|---|---|---|
| 00 | 1 to 1½ | 300 | 1 to 2 |
| 0 | ½ to 2 | 250 | 3 to 4 |
| 1 | 1 to 6 | 300 | 6 to 10 |
| 1½ | 4 to 10 | 200 | 15 |
| 2 | 8 to 15 | 250 | 15 to 20 |

A wound-rotor induction motor is the preferred application of these crushers but a squirrel-cage motor

can handle them if designed with considerable margin in starting torque.

### Rotary Dryers.

Dryers are used to dry the crushed limestone which contains a considerable amount of moisture that must be driven out before the grinding operation can be performed. They are also used for the same reason, for drying the clay and coal.

Auxiliary machinery necessary for the dryer, are fans and conveyors, and usually this auxiliary machinery is considered as integral parts of the dryer, and is driven by the same motor. For a fixed rate of feed the load is constant and as a rule the dryers are operated at a given predetermined speed; therefore, squirrel-cage motors are satisfactory for this kind of service. Squirrel-cage motors with 125% to 175% starting torque, are suitable.

Approximate horsepower requirements are as follows:

| Size of dryer. | Horsepower. | Recommended speed of motor. |
|---|---|---|
| 6 ft. x 60 ft. | 12 | 700 to 1200 |
| 6½ ft. x 60 ft. | 15 | 700 to 1200 |

On some particular installations, the following was found. A dryer 6 ft. in diameter 45 ft. length, 9 rev. per min., connected to a 24-in. x 50-ft. horizontal pan conveyor and to a 14-in. x 35-ft. bucket elevator, required a 30 hp. motor. A 7-ft. x 60-ft. dryer for rock crusher, connected to a 20-in. x 45-ft. inclined conveyor, and 16-in. x 40-ft. elevator, required 40 hp.

Ordinarily, dryers of 5-ft. diameter and 50 to 60-ft. length, revolving at 3 to 5 r.p.m., were found to require between 10 and 20 hp.

### Preliminary Grinding Machinery.

The ball mill consists principally of a revolving horizontal cylinder lined with overlapping iron plates and containing a charge of steel balls. Ball mills are

TABLE 3.
Power Requirements of Ball Mills.

| Make. | Weight of charge lb. | Capacity on cement clinker bbl. per hr. | Hp. req'd. |
|---|---|---|---|
| Gates No. 7 | 3,000 | 12-16 | 30- 40 |
| Gates No. 8 | 4,500 | 18-24 | 40- 50 |
| Smidth (Kominuter) No. 53-½ | 3,000 | ..... | 30 |
| Smidth (Kominuter) No. 66 | 6,600 | ..... | 75 |
| Smidth (Kominuter) No. 88 | ..... | ..... | 100 |
| Krupp No. 7 | 3,520 | 12-16 | 30- 35 |
| Krupp No. 8 | 4,400 | 16-22 | 35- 45 |
| Chalmers & Williams | 10,000 | 60-70 | 100-125 |

low-speed machines generally running from 20 to 25 r.p.m. The charge of balls revolving at this speed causes very severe vibration in the gearing, and motors geared to their countershaft have proved unsatisfactory. Belted motors or low-speed motors for direct connection to the counter-shaft through flexible couplings give entire satisfaction. When starting, the charge of balls and stone must be rotated through nearly 90° before it begins to roll, and the motor torque required at starting varies from 1¾ to 2 times full-load torque. Many of the latest mills are using wound-rotor motors for these grinders of large capacity and the saving in power due to increased efficiency, together with better performance at starting, warrants their use in preference to the squirrel-cage type. Table 3 indicates the power requirement for a few typical ball mills.

There are a number of different mills that may be classed generally as ring-roll. In these, the material is crushed by means of a ring or large balls rolling inside and against the ring or die. In some types this ring rolls also. Under this general type are classified the Kent mill, Griffin mill, Fuller mill, Bonnot mill, Raymond mill, Sturtevant Ring-Roll mill, Huntington mill and others.

### Finishing Grinding Machinery.

For the fine grinding of limestone or clinker, the tube mill is used extensively, both wet and dry. The usual form is that of a rotating cylinder and the grinding is done by attrition or by the rubbing together of the grinding medium and the material to be ground. The mill is generally filled to about the center line, and the grinding medium, or charge, as it is usually called, consists of either flint pebbles, cast iron balls, or gorged steel balls, etc,, depending on the design of the mill and the comparative costs of the various grinding mediums. There are several types of tube mills in commercial use, designated as follows:

1. The plain tube mill using flint pebbles as a grinding medium.

2. The plain tube mill with ball-peb compartment. This type of mill has a partition located near the discharge end. The large compartment on the feed end is charged with flint pebbles, while the small compartment on the discharge end is charged with cast iron or forged steel balls.

3. The ball-peb mill using cast iron or forged steel balls as a grinding medium.

4. The combination or compeb mill with a partition located near the feed end. The small compartment of the feed end is charged with large cast iron or forged steel balls while the large compartment on the discharge end is charged with small cast iron or forged steel balls.

The power requirements of these different types of mills vary not only with the size of the mill, but also with the nature and amount of the charge used. Once the mill is started, the load is practically constant and only slight pulsations in power can be noticed. The power required to drive these mills has been determined from actual tests and refers to dry grinding conditions only. For wet grinding the power required is approximately 30% less than for dry grinding, other conditions remaining the same.

The tendency is also towards lower speed motors geared to the mills in place of the higher speed belt driven type previously used.

### Rotary Kilns.

For supplying rotary kilns powdered fuel is required in most cases and the crushing plant for this uses the same class of crushing and grinding machinery as has already been described for handling limestone and cement.

The kiln itself is a long cylinder lined with fire brick, revolving on an inclined axis and fired from the lower end. The material is introduced at the upper end and works its way through the kiln in from one to two hours. A speed variation is necessary on the kiln. Therefore either a squirrel-cage motor with speed change gearing or a wound-rotor motor with resistance controller is required; the latter is preferred. The controller should be such as to permit 50% speed reduction on full load torque. Since the kiln radiates a large amount of heat it is preferable to place the motor below the floor or to install it in

TABLE 4.
Power Requirements of Rotary Kilns.

| Size of kiln. | Rev. per min. | Hp. |
|---|---|---|
| 6 × 60 ft. | 1 to 3 | 5 to 7 |
| 7 × 80 ft. | 1 to 2 | 8 to 12 |
| 7½ × 100 ft. | ¾ to 1-½ | 12 to 18 |
| 8 × 120 ft. | ½ to 1 | 15 to 20 |
| 9 × 150 ft. | ⅜ to ¾ | 22 to 30 |
| 10 × 170 ft. | ¼ to ½ | 30 to 40 |

such a manner as to protect it as far as possible from the heat radiation of the kiln. For the same reason motors selected for the work must be liberally rated and have low temperature rise.

## CANADA'S PLANS FOR AFTER THE WAR.

**The Returning Soldier—Preparations for Industrial Developments.**

Canada has the advantage of a certain amount of experience on which to base the plans she is drafting for the return of her mobilized military forces to civilian life. Relatively large numbers of her soldiers have come back and have received their discharge from the army—men who were invalided home or who for other good reasons were released from the military service. It is interesting, therefore, to note that the forecasts made a couple of years ago regarding the inclinations and aspirations of the returned men have not always been realized.

It was expected, for instance, that the men, as soon as they were freed, would gladly avail themselves of the opportunity to begin life anew in the broad unrestricted freedom of the farm and the forest, devoting themselves to agriculture, to hunting and trapping, to mining and to other pursuits in the great out-of-doors; that the men who had been brought up to these pursuits would be eager to get back to them, and that the city men, after their experience in France and Flanders would turn their back to the confining city and would seek elbow-room and opportunity for the development of the sense of individual responsibility and initiative, and for the capacity to look out for themselves and individually to achieve results, which had been inculcated in them in front of the enemy.

But despite all forecasts on the subject, it has turned out that the returning men have evinced no great willingness to go on the land. A Canadian Commissioner who has been in the United States inquiring into the plans which this country is making for the handling of the after-war problems, states that the returning Canadian soldiers drift into the cities and manifest no disposition to get away from them. For the moment at least there is consequently less interest in the land settlement projects, and attention is devoted to other phases of the question.

It may be well to observe here that any attempt to formulate general conclusions from this particular experience in Canada would be unjustified and misleading. For instance, Franklin K. Lane, Secretary of the Interior, as described in an interview with him in *Printers' Ink*, is directing a vast project for the benefit of returning soldiers by converting great areas of waste land into farms, of which the soldiers who shall have done the work of reclamation will be made the proprietors. It should not be rashly inferred from the experience of Canada that returning American soldiers will not desire to avail themselves of the opportunity provided for them by the Government to create and to own and develop farms under new and attractive conditions.

### Too Much Excitement Now in the Cities.

In the cities and other centers of population in Canada, as in the United States at present, there is still the stir and excitement of war, banners waving, bands playing, troops and their train on the march, soldiers everywhere and places for their special entertainment at every turn. The soldier who has lived the experiences overseas, who has gone down to Gehenna and come up to life again, would he not be abnormal if he quit all this intensification of life, if he renounced the satisfaction of appearing among his fellow men as one who had done his noble part, if, when the nation is eager to honor its heroes, he hid his shining claims to the honors and retired to rural quietude to engage in work, the fruition of which will not be in the immediate present? Our soldiers may also be expected to remain in the cities for sometime after they return from overseas. They will have been notified while still abroad of the chance that awaits them to create for themselves farms and to grow up in new and promising community centers. But it is only after they have been home and after the effervescence over their homecoming has begun to subside and men are talking less and less of the war, that the bulk of our soldiers who are going to set themselves to the task of pioneer work are likely to break away from the cities and start out for their new scene of activity.

As there was an interval, a period of training, between the individual as a civilian and the same individual as a soldier, so probably there will be a reverse period of transition while the soldier is passing back into the role of civilian. How long that period may be in the average case, or what the average soldier is likely to do in that period, no one may accurately prophesy. It will repay us to study the greater experience of Canada, but we must be careful not to draw conclusions from one country to another without taking contingent and varying circumstances into account.

The Imperial Munitions Board of Canada has begun an investigation which aims at establishing in as definite a way as possible the extent and character of the unemployment that may result from the stoppage of war work. The Board directs Government plants which represent an investment of $15,000,000. But the investigation has not been applied to these; 432 private firms have already been queried and the reports from these show that 32,000 workers, of whom 8000 are women, would be thrown out of employment by the ending of the war work.

The unemployment problem, however, is not causing grave concern in Canada, as preparations are being systematically made for industrial developments. The Munitions Board has organized the manufacturers of the country, has developed a high degree of efficiency among them, and has constantly had an eye to the day when the war work will be over and when anything like a collapse of industrial activity would be a calamity. Thus the Board has made the islands of British Columbia a scene of great activity for the purpose of producing spruce for airplanes. Sixty-seven logging camps are there in operation, but the end of the war will not cause the axes to be dropped or the saws to cease humming, for the demand for the spruce will continue. Of the 1,654,000 tons of steel involved in producing munitions Canada itself produced 1,400,000 tons. An important development of the Canada steel industry was thus effected, which will continue for the benefit of the country.

Shipbuilding plans have been made that will put 35,000 men at work constructing ninety steamships of a total of 375,000 tons, to cost $71,000,000.

Food production is under the direction of the Canadian Food Board and will probably so remain for some time, for the stabilization of agriculture and of the various industries pertaining to food production.

### Industries Will Continue to Hum.

Great mineral production is being developed in the whole northern country, in Quebec, Ontario and British Columbia. The mining industry is counted on by the Canadian authorities as likely to be one of the great stabilizing influences in the upset of the period upon which we are now entering.

Canada has established an Advisory Council of

Scientific and Industrial Research, which has already been notably effective in stimulating the development of the national resources of the country and in finding new fields of profitable enterprise. It is interesting to note that three years ago the British Board of Education created a permanent organization for the promotion of scientific and industrial research, involving the establishment of a committee of the Privy Council to handle funds that might be appropriated by Parliament for the purpose, and also of an advisory council of scientists and of manufacturers connected with industries that depend for their development on scientific research. The co-operation of the great scientific societies and associations of the United Kingdom was also secured. Parliament made a grant of £1,000,000 for the purpose and the fund was entrusted to the Imperial Trust for the Encouragement of Scientific and Industrial Research to be expended under the direction of the Committee or Privy Council for Scientific and Industrial Research. Arrangements were made for utilizing the fund also in furthering the work of industrial research workers. The Advisory Council of Scientific and Industrial Research of Canada has founded fellowships in Canadian universities, with grants for research work in new industrial and commercial directions.

A method has been developed for briquetting the lignite coal, of which there are huge deposits in Alberta, so that it will burn, it is declared, as the equivalent of the best anthracite, and can be sold as far east as Winnipeg at $7 a ton. Appropriation of $300,000 has been made for the installation of a plant at Estevan, Sask., to demonstrate the method of manufacturing the lignite and to encourage the starting of the industry on a commercial scale.

A process has also been evolved for making gas from the vast waste quantities of straw on the western prairies. Professor McLanrin, of Saskatchewan University, has received the credit for this development. A plant costing $500 will generate straw gas to supply all the needs of a large farm and this discovery is hailed as one of a most beneficial and far-reaching kind. The lumber industry—Canada's largest at the present time, if exceptions be made of the munitions industry—is also being stimulated in all its ramifications, and a special effort has been devoted to improving the distillation of wood alcohol, with a view to effecting economies in other industries.

On the whole, an optimistic view is taken in Canada of the after-war economic situation. The Dominion has been forehanded in its investigations and preparations and is not viewing and particular problem with special alarm. Immigration has practically stopped and fears of there being any sudden insupportable pressure on the labor market have not been entertained.

## 40 PEACE INDUSTRIES NEED 21,000 WORKERS.

Forty peace industries in New York state need 21,000 workers, men and women, skilled and unskilled, for immediate service, according to an announcement made here tonight by the United States employment service. There are more jobs open now than there are laborers to fill them. No war industry up to date has reported that it has workers to release. The demand for workers ranges from engineers to seamstresses, and from managers to cash girls, all for immediate service.

## OUR DUTY TO FRANCE, NOW THAT THE WAR IS WON.

### The Principles That Should Actuate Our Trade with Her.

By W. W. Nichols,

*Chairman of the American Industrial Commission in France and Assistant Chairman of the Allis-Chalmers Manufacturing Co.*

The call from France for the co-operation of the United States in the reconstruction work of many kinds which the war has necessitated is now being more clearly formulated, and practical plans are being made for the upbuilding of France's industries and the free development of her resources.

The nation which for four years has borne the brunt of Germany's onslaught on the liberties of free peoples can with just title look to this country for co-operation for the immense work involved.

The tremendous sacrifices of France—made with such superb courage, without complaint, without theatric gesture, calmly, whole-heartedly—might be rendered in large measure vain if France were to dwindle economically, if she were left involved in the economic web which Germany had been weaving around her. A personal message from President Wilson transmitted to France by M. Franklin Bouillon, the French minister of inter-allied relations, in these words, "We are with France in this war to the last dollar and the last man," has filled the whole French people with comfort and courage.

The United States is now *"l'ange gardien,"* the guardian angel, on whom France has come to rely. The forehanded action of leading American business organizations in extending the hand of friendship to France called the French chambers of commerce to new life and activity, and prepared the way for the creating of commercial and industrial associations in France to aid in planning and carrying out the campaign of reconstruction. What is planned and what is being accomplished is both interesting and important.

When the American Industrial Commission to France went to that country in the autumn of 1916 on the invitation of the French Government, it was warned in advance of its arrival that the French people in places regarded its coming with some suspicion.

Not that any direct hint of this was given by a gifted and courteous people, and indeed the welcome from the first was all that could be desired in the way of kindness and affability. But from various sources it had been learned that apparently a certain resentment had been stirred up against the business mission from America. It was represented that Americans were profiting of France's difficulties to furnish to her the supplies which she must have at exorbitant prices. Items, perhaps of German origin, had been published in newspapers of neutral countries to the effect that America was greedily fattening on the misery of all the belligerent countries, that her aim was to succeed to the commerce and the industrial secrets of the European nations. It was only human that the French, sensitive in their hour of terrible trial, should have paid some heed to these assertions, and to the warnings issued to beware lest the visiting Americans should worm out precious information regarding their special industrial processes.

The chairman of the commission, W. W. Nichols, therefore, realized that a first and absolutely necessary step was to make a prompt and frank statement of the true purposes of the visit. Accordingly, at the outset he addressed the Bordeaux Chamber of Commerce, and through it the French nation, on the subject.

"We have come," he said, "as a small group of American business men with a vision—to do what we can to promote commercial reciprocity. How can we serve France? If we know that, then we are in a position to help ourselves. We are here to offer our services. Tell us your needs and we shall exert our best influence in filling them. We have no other aim. We are not looking for mere selfish commercial expansion. We seek primarily the opportunity to be of assistance and then desire to study with you the way in which America can further aid and promote commercial development with France.

"The exigencies of war," he continued, in substance, "at present leaves the trade balance against France with a vengeance, and this harms our Franco-American relationship. We want to help in righting this unequal condition of affairs as soon as possible.

"It must be our aim to supply to France our special products and to accept from her in return her distinctive products and, desirably, as nearly as possible of equal value. We should not seek to interfere with industry peculiar to France, and France should not plan a fierce competition with us in regard to products which are in a peculiar way our own. The feeling inspired by such a rivalry will frustrate the promotion of better things. The only information, therefore, which we seek is how we can render service to France for the reconstruction of her devastated territory, for the supplying of her industrial needs and for the creation of new enterprises which will further the economic well-being of the Republic."

If it had done nothing further, the American Commission, through this opportunity of dissipating the mists of prejudice against American business and of creating new sentiments of understanding and good will, would have well justified its mission. Here was an enterprise founded on a new policy and ideals in business affairs. It was so novel and so out of the ordinary that to other ears it might have sounded like vague idealism. But in France it fell on ready ears. It was an ideal of foreign commerce which the French temperament could accept with enthusiasm.

Some may say that it is Utopian and vain to hope to inspire an entirely new spirit into the old methods of commerce by giving it a larger and a nobler aim and by planting its roots in the purest spirit of patriotism. But if this is Utopian, then one of the vital purposes of this country in entering the war was Utopian and unattainable. Commercial greed was the root of the evil which precipitated the war of worldwide devastation. After all, were we not in this war with the expressed purpose of changing for all time the conditions which led to the war, of supplanting might by right, of replacing rapine and terrorism by fair and honest principles of international relations? To attain this end it will be essential to wipe out old iniquitous principles of commerce and to put fair dealing in the place of selfish high-handedness. Friendly co-operation must be substituted for murderous competition. The rule must be to live and let live.

That it is not Utopian is proved by the fact that France is willing to take it up at once with America. Foregn trade implies exchange, not exchange of products for money only, the mere medium of exchange, but of products for products, natural, industrial, or their equivalent in services. We should show a willingness to live up to the principle that they who sell should also buy, and resent an unfair attitude in this regard by others. Thus it has unfortunately happened that owing to the special character of the laws and prescriptions which have regulated the tariffs imposed by the United States, the French have considered that they were not equitably treated and they denied to the United States the privilege of the most favored nation in the matter of imports. Indeed, America alone of all the great nations has found an extra tariff barrier raised against her exports to France, the duties on some American wares being double what they are on similar goods imported into France from other countries. This is concrete and practical evidence of the need of embarking on new lines of international business policy.

### The Need Will Be Great.

The needs of France, which can be filled only from the United States, are on such a vast scale as to make heavy demands upon the industrial and manufacturing possibilities of this country for years to come. When the American Industrial Commission was in France more than 750 towns in the war zone had been demolished and needed rebuilding. Four cities of more than 100,000 population and 2500 other towns and villages were then in the occupied territory, with the prospect of their being partially or entirely destroyed before the evacuation of the territory. Not merely raw material—the lumber, brick, steel and iron, cement and the like—will be needed from the United States, but also much that enters into the reconstruction of buildings and the equipment of centers of population. In the war zone, 25 different kinds of textile industries, as well as agricultural, mining, metallurgical, mechanical and electrical industries, which before the war engaged the activities of some 1,500,000 workmen, and which produced products of a value approximating $2,000,000,000, will have to be replaced. From America alone can come the raw materials and the finished machinery and manufactured articles which are needed for this purpose.

Throughout the rest of France the need for the supplies which only America can furnish is even greater than in the war zone. Plans have already been made for the installation of hydroelectric plants of approximately 750,000 hp., and a further installation of 3,000,000 hp. is intended. The industries to which this power will be applied will make immediate demands on the United States for all that this country can supply in the way of labor-saving machinery.

The most serious problem with which France now has to contend is the lack of manual labor. She will be short in the future, as her industries are short in the present, of millions of men, and it will be impossible for her to continue to depend upon female labor as a substitute. Female labor is now saving the nation but it can be only a temporary expedient, restricting the progress of France in other ways while it lasts. In fact, France is so impressed with the gravity of this situation that at the outset this constituted the principal reason for the invitation extended by the French Government to the American Industrial Commission to visit France, the need for labor-saving machinery and devices being imperatively urgent.

Services in practically every domain of modern human effort will be needed by France from the United States. Indeed, there will be similar need on the part of Belgium, Italy, Serbia, Roumania, and to a minor extent, by other countries.

Taking the only proper view of Europe's expectations from America, and regarding the situation not as opportunity for commercial gain but as humanity service, one is almost appalled at the weight of the burden which is about to be thrown on all the industrial, commercial and service resources of the productive brains and skilled labor of the United States.

# Editorial Comment

## Reconstruction in the Electrical Industry

INTO all walks of life the application of electrical science enters. It is apparent therefore that in the reconstruction that is now about to follow the signing of the armistice, to develop more universally and radically with the signing of peace, electricity must play a large, varied and a vital part. With the multitudinous uses of electricity, reconstruction in the electrical industry assumes a vast and solemn responsibility, which devolves in turn upon those comprising and fostering one of the youngest and wealthiest and most indispensable of industries.

The order of things is changing, has changed. Upheavals, thought of as impossible a few years ago, have come to pass. Epoch-making changes have come about so rapidly one after another that they have been passed by with bare mention and little comment. And so the world has changed in five years of agony and strife. The balance of world-power has changed, the world marts have changed, the distribution of raw materials has changed, labor has changed, the ideals of men have changed. The world has changed. And in the new order of things electricity will play a great part, a greater part than it has already played.

After action comes reaction. But the intensive effort, and the aim for higher efficiencies and co-ordination and co-operation in our national and industrial life, while these things may and will change, conditions will not revert to those existing before the war. Greater economy, increased results and conservation will meet with popular support, and it will be largely through the agency of electricity that these things will be brought about.

Samuel Gompers has stated that any lowering of the standard of living will be vigorously opposed by labor. It is only by cheapened mechanical power that the high rates of human compensation of recent years can be met successfully. Electric power, then, is the agent by which production must be increased, the high cost of labor counteracted, and the keen competition of industry encountered in the years to come.

World-wide attention will be accorded fuel conservation as the demands of war give way to the demands of peace. Coal may be cheap again. But it will forever remain valuable, a national asset to be used carefully and not wasted. Here, again, electricity enters as the all-important factor. Improved efficiency of power plants and generating units; the construction of interconnected systems with co-ordinated demands and co-operative effort; the pooling of loads and the giving place of competition for co-operation; the development of water powers and erection of hydro-electric plants; harmonious operation of gas and electricity supply works for the efficient untilization of coal and its by-products, for gas-heating and electrical transmission and distribution, all these are developments that must be brought about or extended.

The industries of the nation have already outgrown the nation's railroads. Our progress will be throttled unless our railroads are taken out of their present state, and their powers of usefulness and present limitations extended. Electrification of railroad terminals, of stretches of densely loaded track, and steep grades through mountainous regions, at once would place our national mode of transport upon a basis conforming to requirements and be a radical movement for saving coal. Partial electrification of railroads must surely be one of the accomplishments the years have in store. And in the natural order of things will come the trolley as tributary to the railroad.

The insatiate demands of war have emphasized the coal-saving possibilities of electric industrial and domestic heating and cooking. Who can doubt the day is surely coming nearer when coal will be carbonized into its thousand valuable products, and its heat used in part for distribution as gas, and in part for the generation of electricity? The day when the mutual value of gas and electric supply is recognized is coming. The war has hastened the day when it is found that the function of gas and electricity are not antagonistic and competitive, but that each can and should be used in their respective spheres, thereby saving coal, making available some thousand products of carbonized coal and abating smoke.

Under the frenzied haste of war the electrochemist and metallurgist have attained many accomplishments. With the coming of peace again, the talent thus turned loose will undoubtedly take up the callings of peace in the endeavor to put to useful purpose equipment used for waging war. Electrochemistry and metallurgy will be developed along broader channels and for different goals, for the benefit of man. And here, too, will be required increasing amounts of cheap electrical energy.

Into the very fabric of our national, industrial and domestic life electricity enters as a vital and indispensable factor. It is the alpha and omega of our national growth. It is the palliative for the high cost and scarcity of man power. It is the wherewithal for saving our resources of water power and coal. It is the eventual solution for our national system of transportation not tomorrow, nor next year, but some day. Therefore reconstruction in the electrical industry must be too vast, its uses too prolific, its worth too

high for passing remarks. Reconstruction of the nation and the nation's industries and reconstruction of the war-worn world is closely and fundamentally interconnected with electricity supply, as reconstruction in the electrical industry is likewise inseparable from world reconstruction.

## *Weagant's Invention a Big Improvement in Radio Service*

TERMINATION of the war permits a brief disclosure of a most important development in radiotelegraphy that was effected soon after our entrance into the world conflict. Having a highly beneficial effect on wireless service, it was obviously not expedient to announce it at that time else it might have helped the enemy as much as it did us. By the consent of the Federal Government the announcement has now been made by the Marconi Wireless Telegraph Co., that its chief engineer, R. A. Weagant, had invented means for overcoming the very troublesome disturbances to radio communication commonly called "static" and incidentally had also solved the interference of one wireless message with another. The full text of the announcement appears on another page of this issue.

In spite of the great developments in wireless of the last score or so of years, by means of which it has been possible to communicate over the widest oceans and continents, static disturbances have been most erratic and at uncertain times of the day have practically prevented intelligible communication. They have been ascribed to various but not definitely known atmospheric conditions and have continued to be the object of much study and research by many investigators. One of these was Mr. Weagant, who after 15 years' patient work on this vexatious problem finally developed its solution just as we entered the war. His epochal invention was immediately placed at the disposal of the Government and, after being given an extended trial, adopted by our navy and promptly, at its request, also made available to the navies of our Allies. It has been used to great advantage during the last year and a half of the war.

Although the details of Mr. Weagant's invention have not been made public, some of its far-reaching effects are already known. Not only does it eliminate the troublesome disturbances of static and thereby make radio service reliable at any time of the day and night, but it makes it possible to conduct transoceanic and other long-distance radio communication with much less power than has heretofore been necessary; moreover, it permits dispensing with the high and expensive antenna towers formerly required; furthermore, by its solution of the problem of interference, it enables nearby stations to transmit their messages simultaneously without conflict or mutilation of messages. Clearly, these are highly important and most beneficent improvements that Mr. Weagant has bestowed on radio service. In fact, he has given it such an impetus as to make it a most formidable rival to submarine cable service. Its improved value in communicating with and between vessels at sea and thereby helping to reduce the loss of life from possible shipwrecks is alone a gift of outstanding benefit to humanity.

The disclosure of Mr. Weagant's invention, which was developed as the result of Edisonian perseverance, is but the first announcement of a series of almost marvelous developments that have resulted from the intensified scientific research undertaken to insure and hasten successful termination of the war. When the full facts are presented it will be found that our scientists and engineers contributed to this end in no small measure and at the same time brought about extremely important developments in acoustics, optics, chemistry, aeronautics and other branches of pure and applied science. Thus, while science helped make the war more destructive and therefore less prolonged, it also helped accelerate the progress of the world and advanced the arts of peace.

## *Care in Placing Blame for Service Complaints*

A MESS of trouble has been created in one of the large cities by a sudden swarm of complaints of overcharges for a certain kind of public utility service. Bills rendered for a recent month were quite perceptibly larger than for preceding months. Contributing to this were a number of easily explained causes, including greater use of light for the gradually shortening days, greater use of heat during the colder weather, and a rate increase recently granted by the state public service commission. At the same time a number of apparently inexplicable fluctuations in bills occurred, due, it was said by an executive of the company, to irregularities in reading the meters. In common with other utilities, the company has been shorthanded and has not had enough trained meter readers to do the work properly. The assertion was made that quite a few of the new men cut their routes and estimated what the meter reading might be without visiting the premises. This accusation, instead of clearing the skies, served actually as a boomerang to the company.

The evil of careless placing of blame is twofold. It does not palliate the complaints, nor does it develop loyalty among the utility's employes. The present period of high prices and labor shortage calls for special candor in explaining the true facts to the public. Where certain employes may have been negligent, this fact can be stated without throwing a cloud over the entire staff and thus stirring up their ill-will to add to that of the public. Special care and tact are more necessary now than ever to insure fair treatment of the utility as well as of its employes and of the public in general.

# Week's Events

## *Important Invention in Wireless Telegraphy—Wire and Cable Conservation—Electrical Manufacturers' Club Meets*

### HIGHLY IMPORTANT INVENTION DISCLOSED IN WIRELESS TELEGRAPHY.

**Roy A. Weagant, Chief Engineer of Marconi Co., Invents Method of Eliminating Static Disturbances and Interference Between Messages.**

A radical improvement in radio communication was effected during the war as the result of a most far-reaching invention the scope of which has just been disclosed in the following statement which has been issued by Edward J. Nally, vice-president and general manager of the Marconi Wireless Telegraph Co. of America.

"With the conditions that pledged us to absolute secrecy no longer prevailing, the Marconi Wireless Telegraph Co. of America is permitted to announce a discovery and invention in wireless telegraph that will mark a new era in world communication. It is America's contribution to science in solving a problem that has engaged the best scientific minds of the world.

"Ever since the genius of Marconi made wireless telegraphy a fact, the only limitations of this method of communication was the deadly phenomena of 'static conditions.' It was 'static'—the presence of a large amount of uncontrolled electricity in the air—that at the beginning of the war often entirely prostrated the wireless service even between the most powerful stations erected in Europe and America. Static conditions were responsible for abnormal delays and for the mutilation of words in wireless messages.

"It was the one great obstacle to continuous communication by means of electromagnetic waves in the air. So baffling was the problem that Marconi issued a personal appeal to every wireless operator in the world to record his observations and to collect data on the subject. Some of the leading scientific minds in the universe struggled to overcome the effects of the static disturbances. World-wide researches were instituted and large sums of money expended, but the end sought was not obtained.

"It remained for an American radio expert, Roy A. Weagant, chief engineer of the Marconi Wireless Telegraph Co. of America, to discover the solution of the static problem. Weagant practically had devoted his life to a study of this perplexing phenomenon, and the result of 15 years of experimental work was about to be published to the world when the United States entered the great war.

"Although patent applications had been made and the claims allowed by the United States Patent Office, the Weagant system was immediately placed at the disposal of the American Government, and every precaution was taken to keep the invention secret until the discovery could be safely announced. With the spirit of research that has made the Navy such a magnificent arm of our military service, officials of the Navy Department assigned naval experts to co-operate with the inventor in installing experimental stations in various parts of the country. These stations are now receiving messages from all the high-power wireless stations of the world.

"With the consent of the Marconi company, the United States Navy Department disclosed the Weagant invention to our Allies, and special representatives of the French and British Governments were sent here to study the system.

"Among the revolutionary changes that the new system effects in wireless installations will be the immediate disappearance of the huge steel towers heretofore built at great height to catch the incoming wireless waves. Equipped with the Weagant invention, the wireless receiving antennae are stretched merely a few feet above the ground.

"Heretofore, also, the increasing number of high-power stations that were being erected in every part of the world raised the difficult question of 'interference.' Crossing wireless messages that shot through the ether sometimes made the wireless signals so indistinct that they could not be understood, or drowned the weaker transmission entirely. The Weagant system, based on a unique selective principle, eliminates interference and permits absolutely clear communication, regardless of the operation of other stations even in the immediate vicinity.

"The notable contribution to wireless telegraphy opened by Mr. Weagant's discovery makes continuous wireless communication over the oceans and between continents an absolutely assured fact for 24 hours of the day and at every season of the year, regardless of atmospheric conditions. All the Marconi high-power stations are being equipped with the Weagant system, and the stations of the Pan-American Wireless Telegraph & Telephone Co., which are to link North and South America in a closer bond of brotherhood, will likewise be equipped. In all probability the United States, as well as the Allied Governments, will adopt this system.

"Mr. Weagant, who has been a distinguished radio engineer for 15 years, is only 37 years old. He is a graduate of McGill University in Canada and a fellow of the Institute of Radio Engineers."

### EFFICIENT USE OF ELECTRIC POWER IN COAL MINES URGED.

The approach of peace has materially altered the plans of the production bureau of the United States Fuel Administration for conserving electric power used at coal mines. It had been planned to establish a field organization throughout the coal producing fields of the country in connection with obtaining increased efficiency in the use of electric power in coal production.

The return of peace conditions will make this organization, which was outlined in a statement recently issued by the Fuel Administration, unnecessary, and the work will undoubtedly be undertaken on a restricted scale.

## INSULATED WIRE AND CABLE INDUSTRY PRESENTS CONSERVATION PROGRAM.

**Manufacture of Many Unnecessary Types and Grades of Wire and Cable Stopped or Standardized.**

At a meeting of the rubber insulated wire and cable industry, called by the war service committee of that industry, it was voted to submit to the War Industries Board the following program of conservation on rubber-covered wire and cables. This program is to become effective two weeks after approval by the War Industries Board but is not to affect material in stock or in process.

*I.*—Manufacturers to carry in stock but one grade of any given type and size of wire.

*II.*—Stop the manufacture and sale of rubber-insulated National Electrical Code double-braided wire No. 8 B & S. gauge and smaller and National Electrical Code twin wire No. 8 and smaller. Substitute therefor single-conductor single-braid wire.

*III.*—Limit the number of colors to be used on outer braids of flexible cords, silk, cotton or mercerized thread, to four, namely, black, green, yellow and red (white not counted as a color).

*IV.*—No cartons to be used in packing flexible cord or other wires. However, present stock of cartons may be utilized.

*V.*—Reduce the number of standard types of National Electrical Code flexible cords and portables as below. (Compare with rule 51*d* of the National Electrical Code.)

| Use. | Type Letter. | Trade Name. | Notes as to Manuf'ture. |
|---|---|---|---|
| Pendants (dry places) | C | Lamp cord | Continue |
| Pendants (damp places) | CB | Brewery cord | Continue |
| Pendants (damp places) | CC | Canvasite cord | Continue (a) |
| Portables (dry places) | P | Reinforced cord | Discontinue(1) |
| Portables (dry places) | PO | Parallel cord | Discontinue(2) |
| Portables (dry places) | PS | Sp'l reinforced | Discontinue(3) |
| Portables (dry places) | CA | Armored cord | Continue |
| Portables (dry places) | PA | Armored reinf'd | Discontinue(4) |
| Portables (damp places) | PWp | Reinforced cord, weatherproof | Discontinue(5) |
| Portables (damp places) | PkWp | P'kingh'se cord | Discontinue(6) |
| Portables (damp places) | PAWp | Armored reinf. | Discontinue(7) |
| Theater stage | T | Theater stage cable | Continue |
| Theater border | B | Border-light cable | Continue |
| Elevator light and control | E | Elevator cable | Continue |

Notes—(a) Use CC (canvasite cord) for portables as well as pendants, outer braid weatherproofed for damp places or dry for office and dwelling use.
For 1, 2 and 3, substitute type CC with dry braid finish.
For 4, substitute type CA.
For 5, 6 and 7, substitute type CC with weatherproof finish.

*VI.*—Conserve tin in stranded conductors of seven wires or more; wires not coming in contact with the insulating compound (*i. e.* wire strands) not to be tinned.

*VII.*—Eliminate wires of special diameter in manufacture of stranded conductors and conform to table herewith.

PROPOSED TABLE OF STANDARD STRANDED CONDUCTORS.

Using only American (B & S) Gauge Individual Wires.

| Stranding. | A. C. M. | Nearest Present Standard B & S Gauge. | Diameter—Present. | Diameter—Proposed. | Diff. Diams. Add. | Diff. Diams. Less. |
|---|---|---|---|---|---|---|
| 127/8 | 2,096,770 | 2,000,000 | 1.632 | 1.670 | .038 | .... |
| 127/9 | 1,662,940 | 1,750,000 | 1.527 | 1.482 | .... | .045 |
| 91/8 | 1,502,410 | 1,500,000 | 1.413 | 1.415 | .002 | .... |
| 91/9 | 1,191,555 | 1,250,000 | 1.289 | 1.254 | .... | .035 |
| 61/8 | 1,007,000 | 1,000,000 | 1.153 | 1.154 | .001 | .... |
| 61/9 | 798,735 | 800,000 | 1.031 | 1.029 | .... | .002 |
| 61/10 | 633,300 | 650,000 | .893 | .917 | .024 | .... |
| 37/9 | 484,480 | 500,000 | .815 | .800 | .... | .015 |
| 37/10 | 384,095 | 400,000 | .729 | .714 | .... | .015 |
| 37/11 | 306,360 | 300,000 | .631 | .635 | .004 | .... |
| 19/9 | 248,785 | 250,000 | .576 | .572 | .... | .004 |
| 19/10 | 197,240 | 211,600–4/0 | .533 | .510 | .... | .023 |
| 19/11 | 156,445 | 167,800–3/0 | .471 | .454 | .... | .017 |
| 19/12 | 124,070 | 133,100–2/0 | .420 | .404 | .... | .016 |
| 19/13 | 98,380 | 105,500–1/0 | .374 | .360 | .... | .014 |
| 19/14 | 77,900 | 83,690– 1 | .333 | .320 | .... | .013 |
| 7/10 | 72,665 | 66,370– 2 | .296 | .306 | .010 | .... |
| 7/11 | 57,640 | 52,630– 3 | .263 | .272 | .009 | .... |
| 7/12 | 45,710 | 41,740– 4 | .234 | .243 | .009 | .... |
| 7/14 | 28,750 | 26,250– 6 | .186 | .192 | .006 | .... |
| 7/16 | 18,080 | 16,510– 8 | .147 | .153 | .006 | .... |
| 7/18 | 11,370 | 10,380–10 | .117 | .121 | .004 | .... |
| 7/20 | 7,150 | 6,530–12 | .092 | .096 | .004 | .... |
| 7/22 | 4,495 | 4,107–14 | .073 | .076 | .003 | .... |
| 7/24 | 2,828 | 2,583–16 | .058 | .060 | .002 | .... |

*VIII.*—Where special strands of greater flexibility are necessary only American (B & S) gauge wires are to be used.

The above restrictions do not apply to direct orders from the United States Government but it is hoped that all departments will make their requests conform to the program as and when approved.

The committee making these recommendations was composed of Wallace C. Clark, chairman; Edward Sawyer, vice-chairman and secretary; T. Whitney Blake, Joseph C. Belden and George B. North.

## ELECTRICAL MANUFACTURERS' CLUB MEETS.

**Three-Day Meeting Held at Hot Springs, Va., to Discuss Important Problems of the Day.**

The Homestead, Hot Springs, Va., was the scene of the regular fall meeting of the Electrical Manufacturers' Club on Nov. 14 to 17, and a representative gathering of the princes of the industry disentrained in the shadow of the Shenandoah hills on Thursday morning with outing suits and golf clubs, forming the conspicuous portion of their impedimenta. The palatial Homestead ably cared for all their needs and ideal weather afforded the unrestrained use of the famous Homestead 18-hole course by the entire attendance throughout the meeting. James M. Perry, of the Johns-Manville Co., won the golf championship cup.

President L. A. Osborne was unable to attend and H. B. Crouse therefore acted as president pro tem. All arrangements for the meeting were ably administered by Commissary F. W. Sanford.

On Thursday evening was held the informal dinner, followed by able speakers on the vital problems of the day as pertaining to the electrical industry and the close of the World War.

On Friday evening the annual election of officers resulted in choice of the following:

President, H. B. Crouse, Syracuse, N. Y.
Vice-president, Leroy Clark, New York City.
Secretary, Shiras Morris, Hartford, Conn.
Treasurer, Fred. L. Bishop, Hartford, Conn.

Following the election, Prof. Comfort A. Adams, of Harvard University, president of the American Institute of Electrical Engineers, gave an able address on "Electric Welding as Applied to Shipbuilding."

Those in attendance were the following:

Prof. Comfort A. Adams, American Institute of Electrical Engineers; W. R. Burrows, Edison Lamp Works; A. N. Barrie, National Carbon Co.; S. B. Beldon; A. W. Berresford, vice-president Cutler-Hammer Manufacturing Co.; Prof. F. L. Bishop, University of Pittsburgh; D. R. Bullen, General Electric Co.; Walter Cary, president, Westinghouse Lamp Co.; C. C. Chesney, manager, Pittsfield Works, General Electric Co.; Maurice Cortes; H. B. Crouse, Crouse-Hinds Co.; J. B. Crider, National Carbon Co.; W. Garland, Ohio Brass Co.; E. B. Hatch, Johns-Pratt Co.; F. W. Hall, Sprague Electric Works of General Electric Co.; Conrad Hubert, Eveready Lamp Co.; F. S. Hunting, Fort Wayne Works of General Electric Co.; H. Hertz,

Diehl Manufacturing Co.; Frank Kuhn, Pettingell-Andrews Co.; D. H. Murphy; W. W. Nichols, Allis-Chalmers Manufacturing Co.; S. L. Nicholson and L. A. Osborne, Westinghouse Electric & Manufacturing Co.; M. A. Oudin and C. E. Patterson, General Electric Co.; H. T. Paiste, Bryant Electric Co.; J. M. Perry, Johns-Manville Co.; F. W. Sanford, General Electric Co.; B. E. Salisbury, Pass & Seymour, Inc.; H. D. Shute, Westinghouse Electric & Manufacturing Co.; B. H. Scranton, American Electric Heating Co.; C. W. Stone, General Electric Co.; G. W. Stewart, consulting electrical and mechanical engineer, Melbourne, Australia; F. S. Terry and C. E. Thompson, National Lamp Works of General Electric Co.; J. E. Way, R. Thomas & Sons Co.; A. D. Page and W. H. Roberts, Edison Lamp Works of General Electric Co.

## AMERICAN INSTITUTE HOLDS 344TH MEETING AT TORONTO.

**Interesting Program Arranged by Toronto Section.**

The 344th meeting of the American Institute of Electrical Engineers was held at Toronto, Can., Nov. 22-23, at the Engineers' Club. For this meeting, which was held under the auspices of the Toronto section, a very elaborate program, including several interesting and instructive talks, was arranged and in addition an excursion to one of three surrounding places was offered the delegates.

At the Friday afternoon meeting Arthur H. Hull, chairman of the Toronto section, presented a paper on the Electrical Power Development in Ontario, after which W. G. Gordon of the Canadian General Electric Co. described the electrical equipment of the Canadian Northern tunnel in Montreal. At dinner the members and delegates were addressed by Sir Robert Falconer. At the evening session, S. Svenningson of the Shawinigan Water & Power Co. explained the 110,000-volt transmission line over the St. Lawrence river.

Saturday morning, very interesting technical excursions were arranged to the Leaside munition plant, one of the largest and most complete shell factories in America; the British Forgings Co., where the world's greatest electric steel plant, operating ten 6-ton Heroult furnaces, is located; or to the Hydroelectric Laboratories and 110,000-volt substation.

## COAL ZONING SYSTEM SAVING MILLIONS.

Estimates made earlier in the fuel year, that approximately 160,000,000 car miles would be saved in the coal year through the operation of the zone system for the distribution of bituminous coal, are being fully realized, according to the United States Fuel Administration.

This system, made possible through the close cooperation of the United States Railroad Administration with the Fuel Administration, has had a large share in bringing the nation's supply of bituminous coal to its present proportions, which, with patriotic economy, will be sufficient for the winter's requirements.

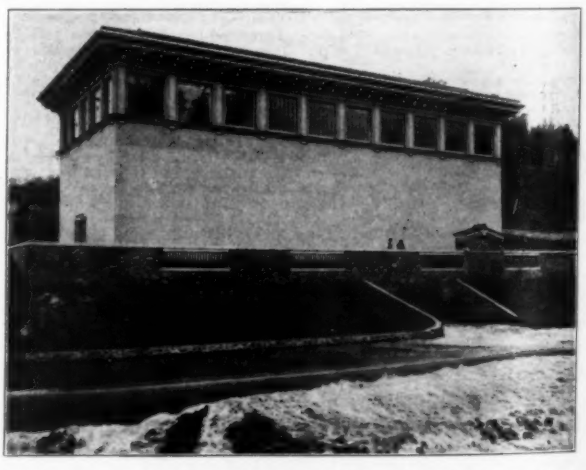
Early estimates were that the movement of bituminous coal affected by the zone system would involve about 300,000,000 tons, or 60% of the total production. The latest figures show that 368,858,000 net tons of this kind of coal have been produced and delivered since April 1, 60% of which is affected by the zone system.

These later figures show that even more than the originaliy estimated 160,000,000 car-miles will be saved in round-trips to and from the mines and that considerably more than the 300,000 additional trips, which the saving in car-miles would effect, will be made. Exact figures have not been compiled, but the early estimate allowed for the 300,000 additional trips being the equivalent of 5% increase in the production.

## GREATER HYDROELECTRIC ENERGY REQUIRED TO RELEASE FUEL OIL FOR STEAMSHIPS.

**Electrification of California Railroads Probable—Pacific Gas & Electric Company's Record of Power Service.**

The electric power shortage in California, estimated at more than 100,000 kw., will not be diminished materially by the cessation of the war, in view of the probable demands for power necessary to release a greater oil supply for steamships. It is figured that 40% of the state's oil production is consumed by the steam railroads, and 11% by public utilities for operating steam-electric and gas plants. What is necessary, then, to meet the situation is a marked increase in power production by hydroelectric plants, rather than an increase of the capacities of steam-driven generators. Steamships for coastwise and export traffic will require a much greater supply of oil than ever before, and the conservation of this class of fuel for that purpose in all probability will be accomplished by the electrification of the steam railroads of the state. Much of the railroad mileage of California is already paralleled by power lines connected with hydroelectric plants, and with modern accomplishments in long-distance transmission the practicability of operating railroad trains with power generated on the mountain streams has already been demonstrated.



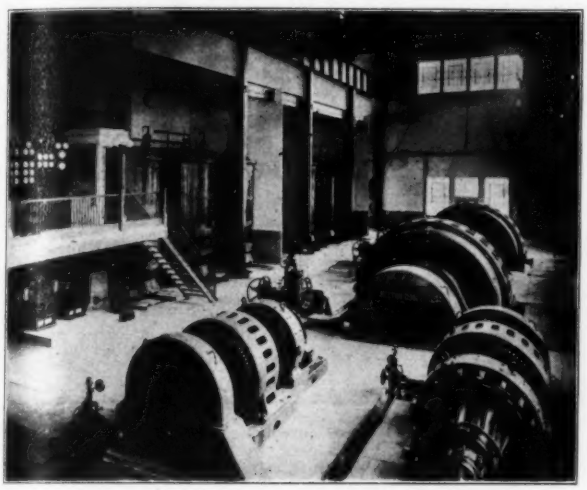
**Wise Hydroelectric Plant of Pacific Gas & Electric Co. With Capacity of 12,500 Kw.**

The power section of the War Industries Board has given an outline of how an increase of over 100,000 kw. may be secured by enlarging the capacities of existing hydroelectric plants and by building new stations in the systems of the several power companies of the state. There is urgent necessity for carrying out those tentative plans, or others of similar intent, and no doubt a way will be found to do so, either with or without Federal aid.

For the year 1917 the Pacific Gas & Electric Co. carried an average load of 97,500 kw., which was an

increase of 11½% over that of 1916. Its 1917 peak load was 158,272 kw. Its total power deliveries for that year amounted to 854,099,030 kw-hr. The company produced 56.1% of this power at its hydroelectric plants and 22.8% at its steam-electric stations; the remaining 21.1% was purchased from other power companies.

A classification of power sales by this company based on 1917 business, shows the following in kilo-



Drum Hydroelectric Plant of Pacific Gas & Electric Co. Capacity, 25,000 Kw.

watt-hours per year: Mining operations, 39,000,000; reclamation pumping for drainage of overflow lands, 11,175,000; cement mills, 50,000,000; general industrial plants and shops, 63,000,000; railway power, 60,000,000; resale power, 25,000,000; gold dredges, 52,310,000. Power delivered to pumping plants for irrigating purposes is not included in the above figures.

This company is constructing and has nearly completed a 110,000-volt line, carried on steel towers, and having a length of 75 miles, for the purpose of delivering additional energy to an active industrial region at the south end of San Francisco Bay and to San Mateo Peninsula. The new line begins in Placer county, 11 miles east of Stockton, and extends southwesterly via Tracy, Livermore and Mission San Jose to the South Bay country. The additional power is required for irrigation pumping, factories and shops. The steel tower line was deemed more reliable and substantial for a high-power line carrying a double circuit.

A 40-mile pole line, to carry a 60,000-volt, single-circuit transmission, is under construction on the west side of Sacramento river. It extends from a point 4 miles north of Calusa to Knight's Landing, and will serve to deliver 8000 kw. at 70% load factor from the Northern California Power Company's system to that of the Pacific Gas & Electric Co.; and at the same time this volume of power will be delivered to the Northern California Co. by the California-Oregon Co. which produces a surplus.

In San Francisco, the Pacific Gas & Electric Co. is installing a General Electric 15,000-kw. steam turbine at its station A; and is installing the necessary steam boilers to serve the new turbine. In like manner additional boilers are being installed at its Oakland plant to bring the steam production up to the capacity of the turbines. Its steam plants, formerly held in reserve, are now operated at full load.

## COMMONWEALTH EDISON SECTION OF N. E. L. A. HOLDS ANNUAL MEETING.

**Awarding of Prizes and Address by Samuel Insull Features.**

The annual meeting of the Commonwealth Edison section of the National Electric Light Association was held in Customers' hall in the Edison building, Chicago, Nov. 20. On this occasion Samuel Insull, president of the company, and one of the leading utility men of the country, addressed the members and other employes of the company. In addition, the report of the officers for the past year was read and the prizes were awarded.

A. C. DeClercq, president of the section, briefly reviewed the events of the last year. In spite of the many difficulties encountered on account of the war, the section had a much better season than was anticipated. Although many of its activities had to be foregone due to the absence of members in service, the ones which did take place were carried out with the usual vigor. On account of conditions it was decided to retain the present officers for another year. They are: A. C. DeClercq, president; W. L. Sees, vice-president; E. S. Butt, secretary; W. L. Fox, treasurer.

As is his custom at this meeting, Mr. Insull briefly reviewed the affairs of the company for the past year. This year, however, he took occasion to thank the members of the company who so ably assisted him not only in the affairs of the company but in the affairs of the State Council of Defense, of which he is chairman, as well. He also complimented them on the manner in which they assisted in the winning of the war. The employes bought close to $2,000,000 worth of Liberty bonds and generously subscribed to all the other war activities. Of the 1368 employes who entered the service, six were killed, and four died.

Mr. Insull, although optimistic about the future, warned against the spreading of the conditions which are now prevalent in many foreign countries. The abuse of liberty which brought about the present conditions in Russia must be guarded against here. As labor is respected by capital, so should capital be respected by labor. Strict adherence to the Golden Rule will be the best method of straightening out our present difficulties and insuring future prosperity.

G. M. Armbrust received first prize and the Insull medal for the best paper presented at a company meeting, and A. F. Bromwell, second. F. X. Mettennet won the golf trophy, the treasury department the bowling trophy and the operating department won the rifle tournament.

## ELECTRICAL JOBBERS TO MEET DEC. 9, 10 AND 11.

The semi-annual meeting of the Electrical Supply Jobbers' Association will be held at the Hotel Statler, Cleveland, Ohio, Dec. 9, 10 and 11. This is the meeting that was scheduled for Oct. 21-23 but which had to be postponed because of the recent epidemic of influenza.

The important program which was arranged for the original meeting will be carried out with the addition of a consideration of the new problems of the reconstruction era which have arisen. The sessions will all be open to the public and an unusually large attendance is expected.

Franklin Overbagh, 411 South Clinton street, Chicago, Ill., is general secretary of the association.

# Commercial

## *Electric Heating in Churches — Station of Chautauqua Traction Co.—Appliances an Economic Necessity*

### ELECTRIC HEATING OFFERS MANY ADVANTAGES FOR USE IN CHURCHES.

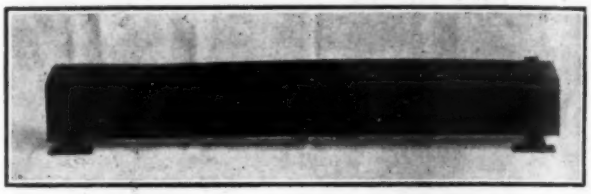
**Short Periods When Heat Is Needed and Cleanliness Make This Method Desirable.**

By Albert Scheible.

While the recent signing of the armistice presages an early peace and a consequent relaxation of the severe restrictions placed on the use of fuel, both the high price of the latter and the general need of economy still make it important that measures should be taken to conserve fuel wherever this may be done to good advantage. In this connection, might it not be well for central stations to consider the feasibility of offering electrical foot warmers to churches as substitutes for the general heating of the latter?

At present, most churches are heated by convection currents of air, and the total amount of fuel required for bringing the interior of a church to a comfortable temperature is entirely out of proportion to the relatively short period for which such an assembly room is ordinarily used. Moreover, even where the customary heating methods are continued, the installation of foot warmers as auxiliaries would add greatly to the comfort of the attendants on any days which happen to be unusually cold. Here the principle involved is exactly the same as that utilized in automobiles or other vehicles, where foot warmers of many and often crude types have been used quite effectively. That is to say, if the feet and legs of a person can be somewhat warmed, this person may easily be comfortable although the temperature surrounding the upper part of his body would otherwise be quite inadequate.

Moreover, this general method of providing comfort for church-goers is not untried, as it has been tested out on a considerable scale in Europe. As far as the writer has been able to ascertain, it was first suggested in 1909 by a pastor who was anxious to secure some method of heating which would not cause either a deposition of dust on the historic mural paintings in case furnace heat was adopted, nor the corresponding condensation of moisture on the antique and beautiful window decorations. Consequently, tests were made with a few electric heaters supplied by different manufacturers, and later electric foot warmers were installed in the pews seating 1200 persons. The plan followed out consisted of providing electric heaters extending end to end for the entire length of the pews and hooded by perforated sheet metal casings which would afford foot-rests, these casings being hinged so that they could be swung open to afford access to the heating units. The results proved so favorable that the same general plan has been adopted in many other churches abroad.



Section of Electric Footwarmer for Church Use.

Tests made in one of these churches implied a remarkably effective concentration of the heat for the intended purpose. With the heating unit itself at a temperature of about 160° F., the sole of the shoe resting on the heater casing was warmed to 81° F., and the room temperature at the height of a person's knee was about 45° F. at the end of an hour, when the initial temperature of the air in the church was at the freezing point. Even in a half hour's time the top of the heater casing rose to a temperature of 68° F., while the air of the room as a whole was only warmed by less than 2°. Consequently, the auditors who kept their wraps on could be satisfied although the church as a whole had not been heated to any appreciable extent.

On turning off the current, the temperature fell somewhat less rapidly than it had risen, so that it might even be feasible to disconnect the supply before the close of the services. At any rate, the rapidity with which this concentration of warmth was obtainable is surprising in comparison with the many hours of time which would be required for warming the same edifice by the more common methods, and this difference in time may make the use of electricity economical even at the customary rates. Moreover, church services are usually held at the time of the load gaps on Sunday mornings, when central stations might well afford to make special rates for stimulating the added load. So, also, the obvious advantage of reinforcing the existing heating equipment on severely cold days by electric foot warmers should make these worthy of consideration both for churches and in other establishments.

Completed Installation of Electric Heaters in Church.

Although the installations now in use are installed in the manner shown, i. e., with the heating units end to end on the floor, it is better, wherever possible, to place them on the backs of the pews about 3 or 4 in. from the floor. This will prevent anyone standing on the heaters, which besides being apt to injure the heater, is detrimental to shoes, as it causes the leather to dry too rapidly and crack.

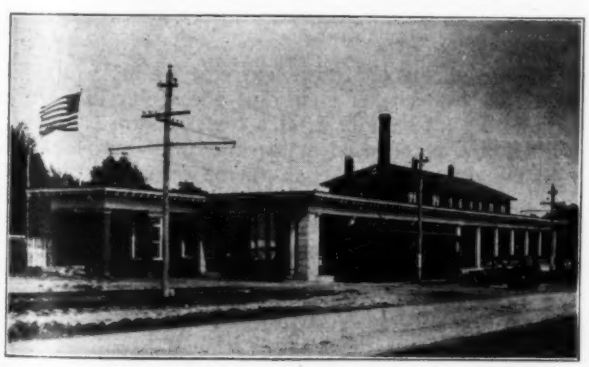
## ELECTRIC TRACTION COMPANIES FIND STATIONS A GOOD INVESTMENT.

**Large Station Erected by Chautauqua Traction Company to Accommodate Visitors at the Institute.**

By W. P. Potter.

During the last few years electric traction companies, especially those having places of interest on their lines, have made many improvements in their terminal and station facilities. Formerly, the usual electric-traction station consisted of a pole marked to designate the point where the car stopped. This lack of facilities, of course, caused the passengers considerable annoyance. In addition, the companies also suffered as the prospect of waiting for trains under such unfavorable conditions kept people away from these places which meant a considerable loss to the company. Furthermore, on account of the crowding which frequently occurred at these points, great difficulty was encountered in collecting and registering the fares as well as many accidents and inability to retain any set time schedule.

The erecting of suitable stations, therefore, was a financial necessity for many companies as well as a mark of service. In many cases this has already proven true. The rent received from concessions for



Chautauqua, N. Y., Traction Co. Station at the Institute.

the sale of souvenirs, etc., alone, not only pays all the operating expenses but a considerable part of the investment cost as well.

The illustration shows a very elaborate station erected by the Chautauqua Traction Co., Chautauqua, N. Y., at the Institution grounds at that place. This station provides ample accommodations for passengers, baggage, freight and express. During the assembly season approximately 50,000 people use this station.

## FUEL BODIES TO BE RETAINED.

A report from Washington states that state and local organizations of the Fuel Administration must be maintained this winter as the possibility of a fuel shortage makes the work of the Fuel Administration vital. Volunteers in local organizations have very largely, in fact, almost entirely, offered their services for as long as they are needed and the local chairmen are requested to give like assurances.

## ELECTRICAL APPLIANCES AN ECONOMIC NECESSITY.

By Sidney Neu.

What is a necessity? What is a luxury?

Purchasers and dealers everywhere are asking this question of themselves and each other. All are anxious for an answer. All want to know whether in purchasing certain appliances they are to be classed as extravagant or merely progressive.

What is the dealer's real duty—to make a quick clean-up of his electric irons and percolators and refill his showcase with cast-iron sadirons and granite-wear coffee pots, or to keep right on selling electrical appliances?

How about the housewife—ought she to shut her eyes to the attractions of the toaster stove and decline to see anything except the three-pronged iron toasting fork?

For an answer to both these questions, consider the case of the electric iron.

Assume that the average user saves 15 minutes a day with her electric iron because it heats more rapidly, stays hot and doesn't have to be carried back and forth to the stove.

Suppose that this saving is introduced into 5,000,000 homes. More than a million and a quarter hours is saved every day by this one common appliance. Actual time saving would amount to the time of 150,000 workers busy 8 hours every day.

Then there's washing. It's a once a week job in most homes, but it takes 6 or 7 hours every time it's done. Assume that your wife serves notice to the laundress (if she hasn't already done so) and installs an electric washing machine. Perhaps your wife will spend only 2 hours of her own time at the job, but she's freeing 6 hours of other labor, which might be extremely useful in other work. A net saving, say, of 4 hours a week.

Suppose that this washday saving is accomplished in 2,000,000 homes. There is a direct saving of more than a million hours a day—the time of 15,000 workers.

Consider the saving in fuel. The average home uses 6 to 8 tons of coal a year in its range. An electric range uses on the average 3 tons of the central station's supply; other fuels in proportion. Greater economy in burning the fuel and more efficient application of the heat; second for the saving, and every heating appliance adds its share to fuel saving for the same reasons.

Decidedly these electrical appliances are not luxuries. They are necessities that can be classed with modern residence heating systems, up-to-date plumbing, running water and electric light.

## SWISS ENCOURAGE USE OF HYDROELECTRIC POWER.

The Swiss Bundesrat has authorized the Department of Public Economy to make all reasonable arrangements to insure the greatest possible use of available hydroelectric energy as well as to create additional plants and harness water power wherever feasible.

# Operating

## *Fuel-Saving Suggestions by Mail—Emergency Repair to Ducts—Removing Steel Stacks by Fire—Insulator Failures*

### HELPING POWER PLANTS SAVE COAL BY MAIL.

**Fourth General Letter Sent Out by Joseph Harrington on Rates of Combustion.**

The fourth of the general letters being sent out by Joseph Harrington, administrative engineer, United States Fuel Administration, which the ELECTRICAL REVIEW is publishing every week in the interests of fuel conservation, discusses rates of combustion, and their effect upon performance and coal consumption. This letter is as follows:

THE RATE OF COMBUSTION.

"The rate of combustion per unit area of grate surface has a very great effect on the efficiency of the furnace. Boiler tests will bring out the facts that every boiler and furnace has a point where it is most economical and this point is affected more by the rate of combustion than by the boiler itself.

"To secure high efficiency, therefore, there must be an amount of coal burned per square foot of grate surface per hour that will permit of the most complete burning of the fuel with the least amount of ash pit loss or excess air.

"In the State of Illinois, where chain grates are to be found in abundance, the conditions are substantially as follows: Chain-grate coal is usually classed as screenings or nut and slack. Generally speaking, coal that passes through screens having a two-inch round hole, is the coal classified as above and usually purchased for chain-grate use. This coal will have anywhere from 20% to 40% of nut in it over half-inch size.

"Reference to the draft gauge connected to the furnace will show that in the great majority of installations there is a draft equal to 1/10 to 3/10 in. water column with an average probably around 2/10 in. With modern settings, where value of adequate draft was appreciated by the plant designer, higher stacks exist and the average furnace draft is usually nearer 3/10 in. With this type of stoker it is possible to burn between 25 and 35 lb. of coal per square foot of grate surface per hour. A rule which holds fairly well is that you can burn 10 lb. of coal per square foot of grate surface per hour for each 1/10 in. draft in the furnace. This holds very closely between 20 and 35 lb.

"Under these conditions, as will be explained in greater detail in my letter on gas analysis, 12% of $CO_2$ at the boiler damper is about the maximum desired. Assuming that this is the ideal condition, it will be found that the rate of combustion has a very marked effect thereon. For the proper burning of coal, a fairly high temperature in the furnace is desirable, which cannot be obtained unless there is a brisk fire and consequent generation of heat at a rapid rate.

"When the rate of fuel consumption per square foot on the chain grate stoker drops below 12 or 15 lb. per sq. ft. it is more than likely that there is a large loss of combustible. The first loss will be due to unburned carbon in the ash pit and the second loss will be due to unburned hydrocarbons in the stack gases. Another loss, which could properly be included, would be the excess air which could enter the furnace through the rear or thin portion of the fuel bed. This latter frequently occurs in conjunction with the second, especially in those types of furnaces where the mixing effect is deficient.

"There is under these circumstances very sluggish combustion and the fuel is inclined to burn out unevenly. The stoker is operated at a low rate and the fuel remains on the grate surface a long time. Holes will develop or the rear of the fire will become very thin. If the stoker is operated fast enough to carry the fire back to the rear of the grate, loss in the ash pit is almost unavoidable. Under these conditions, very careful attention to the damper should be paid in order to adjust as nearly as possible the draft and the rate of stoker feed to the rating desired. Where more than one boiler is in service under these conditions of low capacity, it is usually found more economical to definitely bank one boiler and carry the entire load on the other, obtaining from it the maximum efficiency possible and burning just as little coal in the other furnace as feasible.

"Considering the other extreme of high rating, it is a fact that the efficiency of the boiler and stoker drops off very rapidly after a certain point is reached. This point is reached when the maximum draft is applied and no more coal can be completely burned. With many installations, this is reached when about 35 lb. per sq. ft. is consumed. Any attempt to feed more coal under these conditions would simply result in burning off the combustible volatiles before dumping most of the fixed carbon into ash pit. This involves heavy waste and if this condition persists for more than a short time, put another boiler in service.

"Much of the foregoing applies equally to *hand-fired furnaces,* only the rate of combustion practical to develop is somewhat less. Assuming the same general kind of fuel hand firing usually reaches its maximum at 25 to 30 lb. per sq. ft., and unless draft conditions are excellent, 25 lb. will be the limit. The maximum is somewhat less than in the case of the chain grate owing to the difference in the character of the fuel bed and the difficulty of filling the holes in the fire as they develop. It is, however, considered possible if proper care is used in keeping the fire even, to burn as low as 10 lb. of coal per square foot per hour with reasonable economy.

"Inasmuch as other stokers of natural draft type follow along the general lines of the chain-grate stokers, so far as rates of the question are concerned they will not be mentioned here in detail. The underfeed type of stokers is in a separate class on account of the use of artificial draft. It is felt that in Illinois the hand-fired and the natural draft stoker-fired plant will include the large majority of all installations.

"During the week devoted to the study of this matter, and especially in hand-fired plants, I urge you to make an analysis of this situation by finding out the total amount of active grate surface under each boiler and weighing the coal to each boiler for a period of not less than one day. Keep a careful record of the furnace draft and of the coal weighed to each boiler by hours so that you can plot a curve for each boiler showing the coal consumed each and every hour on the basis of pounds of coal per square foot. See how closely this comes to the general principles laid down as above. Make this a matter of record in the boiler room record book for future reference."

## SAVING KILOWATT-HOURS.

Most of the attention for coal saving is restricted to the boiler room and to less extent the turbine room. There are, however, other places where needless waste may be going on. Moreover, this waste is often due to carelessness or thoughtlessness. For example, recently it was found that in two substations of a central-station six large induction regulators were connected to the station bus although these regulators would not be called upon to carry load for seven months.

Each regulator was controlled by contact making voltmeter, hence every change in bus pressure resulted in a readjustment of the regulator rotors in their endeavor to maintain the pressure called for on their line sinde. These six regulators required exciting current, of very low power-factor. Their contact making voltmeters each required excitation of a few watts at low power-factor, and the regulator motor required energy input every time the regulator moved.

The total loss was not large, something over 1000 kw-hr. per annum. But this loss was needless. And who could say what other similar but more serious losses existed? The remedy was, of course, to disconnect all apparatus from the system not required for carrying load or to be in readiness to pick up load on short notice.

## EMERGENCY REPAIRS TO FIBER DUCT.

**Method of Protecting Cable Duct After Landslide.**

When a large high-pressure water main burst, the rush of water tore up the road, washed out a railroad track and left a high-voltage line supported by its conductors. The duct line was rather badly broken up for several reasons, some accidental, some intentional.

The duct line was composed of 10 ducts, 9 of which carried high-voltage cables, several of which it was imperative to keep alive and in service. In making repairs to the cable ducts it was determined to use fiber duct, for reasons to be told. As the duct was to be placed around the conductor without cutting into the cables, on the score of cost as well as because it was important not to interrupt operation of the cables, it was necessary to find a way of placing the ducts around the cables.

As before stated, fiber conduit was employed for making the repairs and the method of surrounding the cables without cutting them was done in the following simple way. One cable was placed at a time, each cable being separated from the others by spacers. The fiber ducts were split lengthwise. When this had been done, each duct, consisting of two sections, was placed around the cable it was to protect, and there wrapped at both ends and at the center with wire twisted tightly. Before bringing the two elements of the duct together a generous coating of sealing compound was applied to the adjacent edges, this making a tight joint through which cement would not trickle. When the various cables had been covered with fiber duct, spacers were judiciously placed and the concrete poured, at once fixing the location of the individual ducts and the entire duct line. Pouring the concrete and preparing the ducts for it followed the ordinary procedure.

It may be pointed out that the use of fiber duct under circumstances similar to the above may offer a very real advantage where a duct can be built up around a cable, thus permitting the cable to remain in service and at the same time saving the high cost of cutting into cables, making splices with their high cost and inherent weakness. The cost is very much higher than at first appears because it is necessary to either construct a manhole where the splicing is done or pull entirely new cable between the two adjacent manholes. Not only did the use of fiber duct in the way described save time, service and considerable cash outlay, but without following the method employed it would have been necessary to purchase considerable new cable at high present price and doubtful delivery.

## POSITION OF INSULATORS AFFECTS FAILURES.

**Georgia Railway & Power Co. Finds Superiority of Vertical over Horizontal Position for Insulators.**

On its Lindale transmission line, the Georgia Railway & Power Co. has changed over all the strain insulators, as a means of reducing insulator failures. Operating reports of the company showed that 30% of the insulators were defective.

The cause of the large number of defective insulators was found to be on account of the combined influence of the elements, the position of the insulators, and their design. Unequal expansion and contraction of metal parts, of porcelain and cement, played a part in the failure, but the chief cause was due the insulators being installed in a horizontal position, their "under sides" thus being exposed to sun and rain, and at the same time acting as pockets for the accumulation of dust and dirt. By changing the type and position of the insulators for a vertical arrangement an umbrella effect is obtained which overcomes the trouble previously mentioned.

## REMOVING STEEL STACKS BY FIRE.

**Oxy-Acetylene Torch Used for Cutting Down Stacks and Hoppers.**

In dismantling several steel stacks of a power house recently, and also the coal bunkers constituting the units served by the stacks, it was determined to use the oxy-acetylene flame, as being quick and comparatively simple and cheap. The steel stacks to be removed were 12 ft. in diameter and 125 ft. in height; the coal hoppers each served a 500-hp. water-tube boiler.

The steel stacks were taken down by cutting through their base immediately above the roof with the oxy-acetylene flame. The stacks were then jacked up on the one side, forcing the stack to tilt over until sufficiently out of line to continue downward under its own weight, but with the rate of travel controlled by a steel hawser and drum. So with the hoppers, these were cut off and allowed to fall to the ground, where they could be carted away after being conveniently broken up.

# Contracting-Construction

## *Essential Features of Switchboard Distribution II—Why Arc Lamps Are Fused Individually—Among Contractors*

### ESSENTIAL FEATURES OF ECONOMICAL DISTRIBUTION SWITCHBOARD DESIGN—II.

**Suggestions and Methods Which Promote Good Design.**

By B. J. Dillon.

It is difficult to definitely describe the practical application of these requirements of good distribution switchboard design on account of the various sizes, uses and needs for which they are designed. Care and attention to details are, of course, the prime factors in securing the best design. However, there are a few suggestions or methods which even when applied in a modified form will enable contractors to more easily design suitable boards.

The arrangement of the distributing switches is probably the most important as well as the most prominent feature of the board. By their layout is determined the operation of the board, its appearance, and the amount of conductor which is required, which, in turn, determines the resistance loss of the board.

A good method to follow in this arrangement is to start from the main switch and place the switches, starting with the heavier ones and working out to the lighter ones. Sufficient room should be left for each switch so that there will be no danger of accidental contact with the adjacent switches in operating them. For this reason not more than three rows of switches should be installed. It is also well, wherever possible, to provide for connecting the switches so that the blades are dead when the switch is open and to place the fuses on the load side of the switch. This reduces the surface left exposed to accidental contact, when the switch is open, to the small clips and allows the fuses to be replaced when dead without opening the main switch.

The number of these distributing switches should be kept as small as possible. Very often, contractors in addition to the main switch install branch switches, which in turn control several smaller switches on the same board. This arrangement, although permitting of simpler and more immediate operation, not only necessitates the use of more labor, switches and conductor and, therefore, increases the contact resistance, but decreases the flexibility of the board, as any abnormal additional load necessitates the changing of these switches in addition to the other work done.

#### Arrangements for Connecting Meters.

The metering equipment should, preferably, be mounted directly above the main switch, eliminating as far as possible any duplication of conductor runs. There are several details which are frequently overlooked in the mounting and connecting of meters. Probably the most important of these is the providing

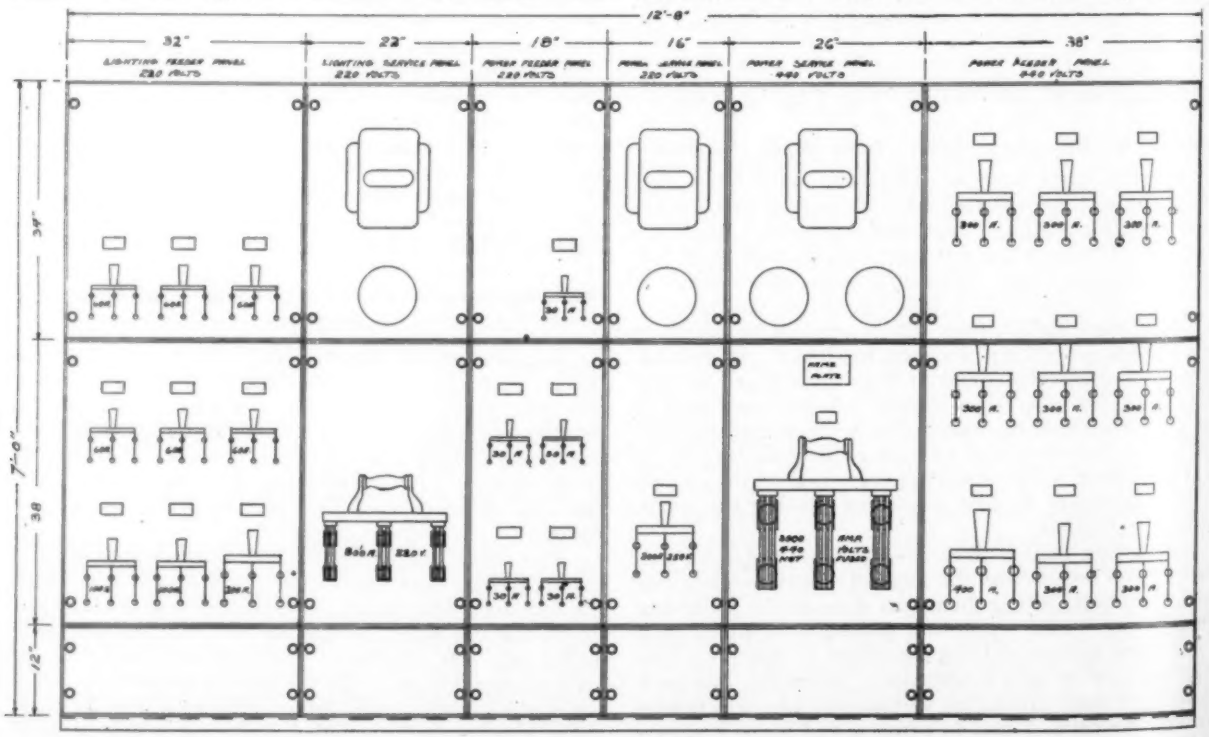



Fig. 1.—Front View of Large Light and Power Board Showing Good Distribution of Switches. On This Board Are Three Classes of Power, 3-Phase, 220-Volt; 3-Phase, 440-Volt; Single-Phase, 3-Wire, 220-Volt.

of jumpers or test links which allow the meter to be taken out of the circuit for testing without interrupting the service. These links should be of the same size as the main busbar and designed so that they can be easily put in or taken out of the circuit. Another

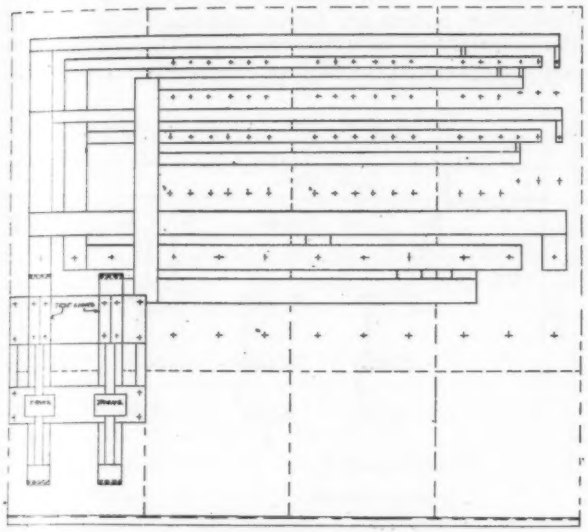


Fig. 2.—Back View of Distribution Switchboard Showing Arrangement of Busbars.

difficulty is frequently encountered in the arrangement of the meter leads. Very often, especially where more than one meter is installed, taps are taken from a main lead running along the back of the board connecting through the board to the meters located on the front. The individual taps should be long enough to permit their being removed or replaced without disturbing the main lead or the other taps. Where current transformers or shunts are used it is often advisable to install a duplicate set of meter leads at some point near the board where an auxiliary meter can be installed while the regular meter is being tested.

The busbars should be installed as simply as possible so that all parts have ample clearance and are accessible for the replacement of fuses and repairs or alterations. This requires that the bus work be of minimum depth consistent with good construction. Proper fiber spacers should be installed to hold the bars in place, especially on the higher bars, as they are too small to be very rigid and in the event of a severe jar or short circuit are apt to buckle and come into contact with each other.

The proper distribution of the busbars varies with each board so that no definite rules regarding them could be applied. To change the size of conductor at every possible place increases the installation cost and possible contact resistance, while neglecting to do so increases the conductor cost.

### Selection of Busbar and Switch Equipment.

The busbars, studs, lugs, switches, etc., should be large enough to carry the rated load and also permits of any reasonable overload or addition, without any undue heating. A fair current density for rolled or drawn copper is 1000 amp. per sq. in., while for cast copper 650 amp. per sq. in. is sufficient. Ordinary copper busbar stock is ¼ in. and ⅛ in. in thickness. The ¼-in. size is generally to be preferred as it is heavy enough to be used for ordinary runs without any extra supports. The ⅛-in. size is often used, however, in parallel, with a small space between the bars for radiation. This is especially desirable for use in warm places such as occurs when a board is to be placed in the vicinity of a boiler, etc. Heavier copper is not recommended on account of the difficulty in shaping it.

Contact areas should also be closely watched as most trouble in switchboards develops from changes in contact conditions, such as buckling or warping of the bars and dust or other foreign substances entering the contact space. Sliding contacts should have an area of not less than 1 sq. in. for 75 amp., while in bolted contacts of drawn or rolled copper not less than 1 sq. in. for 300 amp. should be allowed. Bolted contacts of cast copper or brass should have a contact area of not less than 1 sq. in. for each 150 amp. All lugs should be of such design as to allow ample space for solder contact in soldering cables into them and allow excess solder to drain off.

The above dimensions should be especially followed in the selecting of bolts, studs, etc., for making connections to switches, fuses and other places on the board. It should be remembered that these parts very often have a conductivity of only about 60% of pure copper and unless the conductivity is specified or absolutely known, allowances must be made for this. Very frequently boards have to be overhauled or rebuilt because of hot spots developing in these connections. On account of the short distance which these studs have to carry the current, usually but little more than the thickness of the board, the opinion seems to be that any size will do and that a small cap screw which makes a neat appearance on the board but only allows

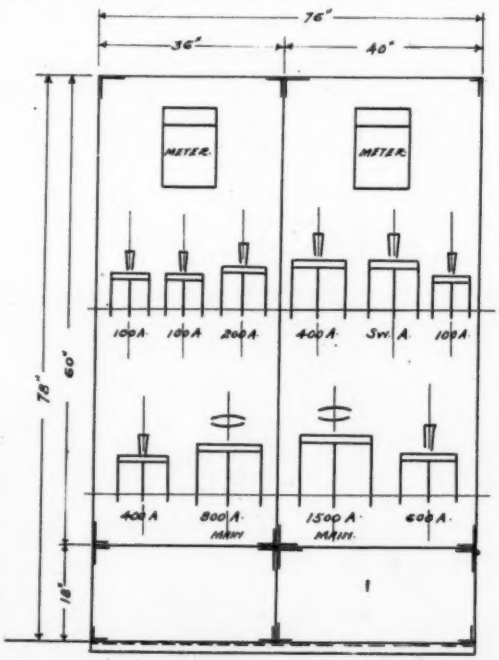



Fig. 3.—An Example of Single Panel Light and Power Boards Showing Good Distribution on Small Boards.

a small fraction of the necessary contact surface, will suffice. This fact should be especially noted by contractors in building their own boards using dismantled switches. The bolt and nut on the ordinary knife switch are not designed to give sufficient contact surface for the switch but merely to hold a lug or fuse terminal over the entire portion of that part of the switch. When these switches are back connected,

therefore, larger bolts and nuts are usually required to obtain the necessary capacity.

Fuse contacts should be equipped with substantial washers of sufficient size to insure contact of the entire fuse terminal. Fuses should be mounted with a view to accessibility and when mounted on the rear of the board should be placed on separate panels. Not more than three tiers of fuses should be used if they are to be accessible from the floor level and not too crowded.

In selecting material for the board either slate or marble can be used. The former, while much cheaper, should be specified to be free from metallic strains as these often cause short-circuits or grounds to develop after the board is installed. Marble, although it makes a much better appearance, is seldom used on account of the excessive cost.

The board should be fastened in place on either a channel iron or pipe framework. The top of the board should be covered with a substantial covering to prevent any damage which might be caused by objects falling on the connections. The bottom of the board should be left blank for about 2 ft. above the floor, unless the board is to be surrounded with a protecting rail, in which case special pains should be taken to prevent sweepers, etc., from coming into accidental contact with the live parts of the board.

The illustrations show some very good designs of switchboard constructions. In Fig. 2, which is an example of good bus work, the crosses represent the switch connections. The bottom row contains three 400-amp. switches, the middle and top rows six 100-amp. switches each. The boards shown were designed

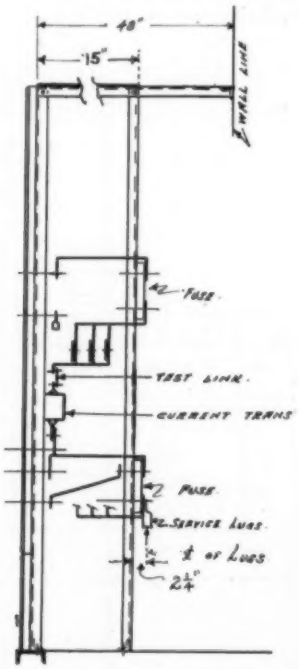



Fig. 4.—Side View of Fig. 3, Showing Method of Supporting Board and Busbars.

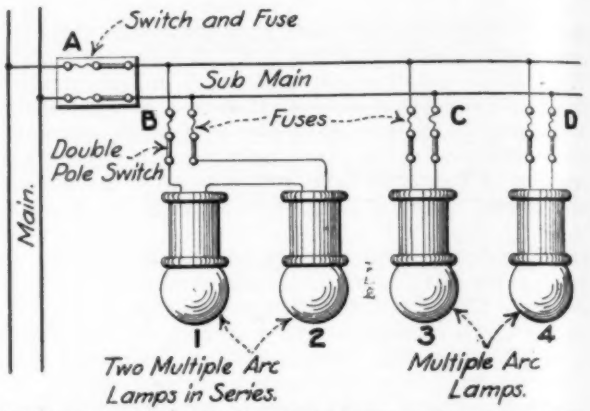
and built by the Chicago Switchboard Co., 426 South Clinton street, Chicago.

The foregoing discussion has not attempted to be comprehensive, but merely has aimed to call attention to a few of the more common examples of faulty design in low-tension boards, which usually mean needless expense to the electric contractor and trouble to the owner of the board.

## WHY SEPARATE CUTOUT IS REQUIRED FOR EACH ARC LAMP.

By L. C. Richards.

The reason that each arc lamp or series of lamps should have its own cutout, as shown in the attached illustration, is that arc lamps take very large currents at the instant of starting—that is, before the mechanism has separated the carbons. Sometimes the mechanism sticks and the carbons remain in contact, which then constitutes a short-circuit. In view of this condition, unless each lamp or series of lamps is protected with its own fuse, the circuits are liable to be overloaded or all of the lamps on a circuit may be extinguished by the blowing of the main fuse through which that circuit is supplied. A series of arc lamps comprises two or more lamps in series, as shown at 1 and 2. Flame arc lamps are sometimes connected in this way across 110-volt circuits and also carbon arc lamps may be arranged in accordance with this method on 220-volt circuits.




Wiring of Individual Arc Lamps or Group of Arc Lamps With Individual Cutouts.

In this respect arc lamps differ radically from incandescent lamps, which may be connected in multiple (up to 16 40-watt or 25-candelabra lamps, or in special cases 32 lamps) to the same circuit with only one cutout to the circuit. It is this contrast between the cutout requirements of incandescent and arc lamps that is often not understood by the electrician.

## AMONG THE CONTRACTORS.

The Pennsylvania Railroad Co. has awarded a contract to Charles Geller, 230 Park lane, Trenton, N. J., for electric work in connection with a new office building and roundhouse addition now being erected at its properties at Trenton.

The Lord Electric Co., of New York City, has been awarded the electrical contract in connection with the eight new plant buildings being erected by the Bartlett Hayward Co., Baltimore, Md., at a cost of approximately $500,000.

L. K. Comstock & Co., 21 East Fortieth street, New York City, have been awarded a contract for electrical work in connection with the new hospital to be erected by the Government at Mineola, L. I., at a cost of $2,468,000. The company also received the contract for electrical work in connection with the new storehouse to be erected by the Navy Department, at the Philadelphia Navy Yards at a cost of $1,263,000.

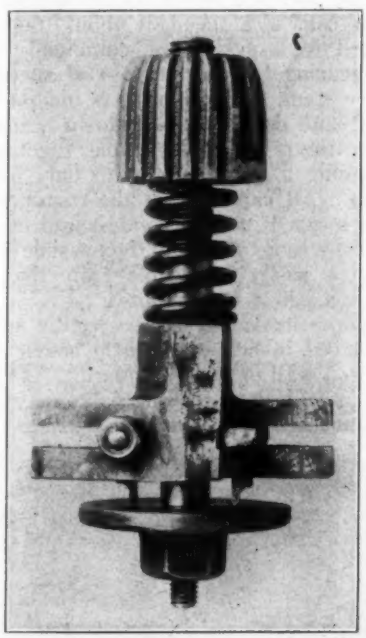
# New Appliances

## *Jiffy Cutter Facilitates Cabinet Work—Luckiesh Electric Fountain of Simple Design—Dean Electric Valve Control*

### NEW DEVICE FOR CUTTING HOLES IN CABINETS.

The "Jiffy Cutter" recently placed on the market by Koch & Sandidge, 23 South Wells street, Chicago, should prove of considerable interest to electrical contractors and dealers. The cutting of large holes in service and distribution cabinets has heretofore been regarded as an expensive, tedious job consisting of drilling or heading a number of holes in a circle the desired size and then chipping this hole out. This job usually takes considerable time and when completed often leaves much to be desired.

The "Jiffy Cutter" accomplishes the same task in

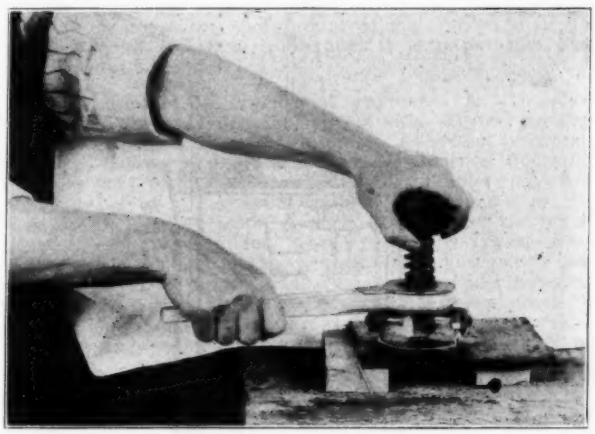


New Jiffy Adjustable Cutter.

a very few minutes and makes a much cleaner and rounder hole than is possible when the old method is used. This cutter, which is illustrated herewith, is a small device composed of a cutter and a ratchet wrench easily carried around from place to place. The operation and the machine itself are extremely simple and no experience is necessary to use one.

In applying the "Jiffy Cutter" a hole must first be drilled into which the screw at the bottom is inserted. The nut must then be tightened so that the knives or cutters are held firmly against the surface to be cut. These knives are easily adjusted for a hole of any diameter up to the capacity of the cutter. The ratchet wrench is then put on over the top. In operating the wrench the knives are turned around on the surface and by screwing down the knurled nut at the top sufficient pressure is exerted on them to cut the material.

The "Jiffy Cutter" is made in three sizes. The No. 1 outfit cuts holes from 1¼ in. to 3 in. and the No. 2 from 1⅜ in. to 6 in. The No. 12 outfit is a combination of both these sizes. In addition to the



Close Up View Showing Method of Tightening Knives.

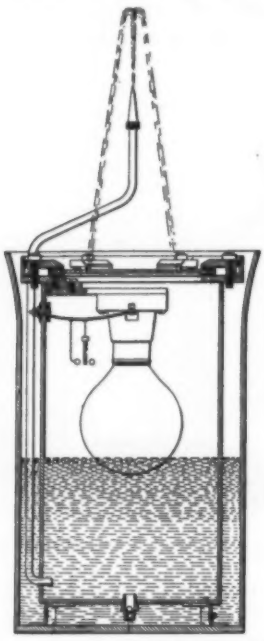
holder and ratchet wrench the outfit consists of a small knife-holder wrench for adjusting the knives.

New knives or cutters can be secured as they are needed. In addition special knives can be furnished which will cut material from ½ in. to 2 in. in thickness. This makes this appliance especially desirable to electrical men as in addition to the metal cabinets slate or marble, fiber boards, etc., can be cut.

Method of Using Cutter to Make Holes in Cabinets.

## SIMPLE ELECTRICALLY OPERATED FOUNTAIN.

An exceedingly simple electric fountain has been patented by Matt Luckiesh, the well-known physicist of the Nela Research Laboratories at Nela Park, Cleveland, Ohio, the patent being assigned by him to the General Electric Co. He merely places a 150-watt Mazda lamp in the upper part of an airtight vessel partly filled with water, and having an outlet tube connecting its lower portion with a nozzle of capillary dimensions. The expansion of the air above



Simple Type of Illuminated Electric Fountain Invented by M. Luckiesh.

the water, due to the heat given off by the lamp, forces the latter out through this nozzle and the spray is caught and overflows into an outer vessel. When the current is turned off, the air pressure falls and the water returns to the inner vessel through a check valve at the bottom. This patent (No. 1,280,784) was granted Oct. 8, 1918, on an application filed April 29, 1916.

## INSTALLATION OF DEAN VALVE CONTROLS.

Motor-operating mechanisms have been applied to numerous water and steam valves, especially those of large size and where it was desirable to operate the valves from a distant point. However, only recently have they been used for purely industrial applications.

Electrical engineers of steel plants will be particularly interested in the accompanying illustration, which shows two Dean valve controls on the delivery side of the blowers which supply air to the blast furnace of the Mark Manufacturing Company's new plate mill near Indiana Harbor, Ind., which was described in the ELECTRICAL REVIEW of May 11, 1918.

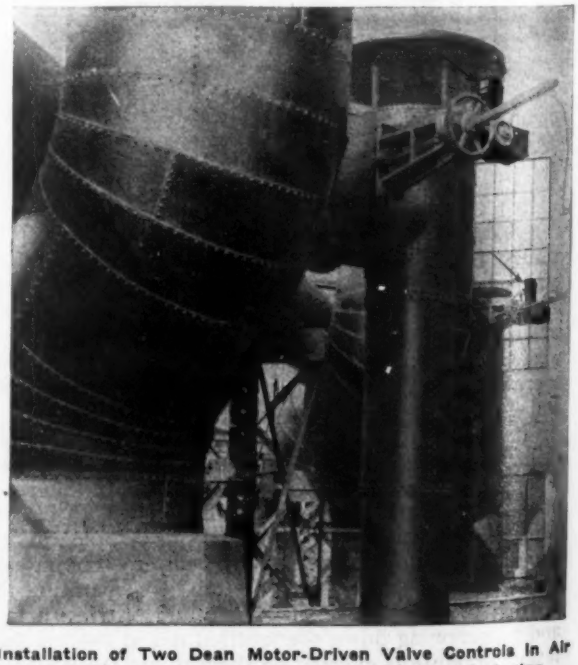
The air for the blast furnace is supplied by two Ingersoll-Rand five-stage turboblowers rated at 4000 hp. with a speed of 2250 to 2800 r.p.m. and an air delivery of 34,400 to 55,000 cu. ft. per min., at 14 lb. pressure. The air is taken in through two 72-in. intakes; the screened top of one of them can be seen in the illustration. The two discharge lines are 36 in. in diameter and lead from the blowers in the power house to the main discharge line just outside.

From the illustration it will be seen that the valves are placed approximately 15 ft. above the ground, hence, they would be awkwardly inaccessible to operate by hand, besides, it would be very inconvenient to operate the steam throttle on the turboblowers and valves simultaneously. At least two attendants would be required to close the throttle of the turbine and the gate valve at anywhere near the same time. In order, therefore, to make the operation of the valves convenient and to guard against any serious irregularities of the air flow to the blast furnace, two Dean valve controls were installed in the two 36-in. discharge lines with the valve-control stations located near the turbine throttles. With this equipment the engineer can start the turbine and then, by merely placing the handle of the valve-control station in the open position, open the corresponding discharge valve.

The Dean valve control is made by the Cutler-Hammer Manufacturing Co., Milwaukee and New York. Primarily, it consists of a high-torque squirrel-cage motor, limit switches with special gear arrangement and one or more control stations.

The Dean system is entirely electrical in operation, using a fully inclosed motor as the source of power. This motor runs at a speed of about 1600 r.p.m. and is connected to a system of combined worm and planetary gearing for the purpose of speed reduction to the valve stem. The gearing is inclosed in an oil-tight casing and the limit mechanism is included in a space above the gearing, the whole, together with the motor, forming a single unit with only four bolting-down holes. All cables from the motor to the limit switch are incased in steel conduit and the unit is as impervious to moisture as it is possible to make it. The motor is easily removable from the casing and can be changed in a few minutes.

Control of the valves is secured by small control stations, placed in heavy cast-iron boxes suitable for attaching to a wall or floor standard. As many points of control as is desired for one valve may be obtained at any distance from the valve.



Installation of Two Dean Motor-Driven Valve Controls in Air Supply Pipes for Blast Furnace of Mark Manufacturing Company's New Plant.

# Trade Activities

## Westinghouse Electric Erects New Research Building—Economy Fuse & Manufacturing Offers New Cutout Bases

**Fairbanks, Morse & Co.**, Chicago, manufacturers of cranes, compressors, engines, pumps, machinery, etc., have elected three vice-presidents in addition to their former staff. The new officials are R. H. Morse, in charge of purchasing; C. W. Park, in charge of factory sales, and W. S. Hoover, in charge of manufacturing. F. M. Boughey, who resigned as treasurer, was elected secretary and comptroller; W. E. Miller, who resigned as first vice-president, was elected vice-president and treasurer of th company.

**Franklin Electric Manufacturing Co.**, Hartford, Conn., has sold its capital stock to the Westinghouse Lamp Co., New York City. The Westinghouse Lamp Co. announces that the corporate identity of the Franklin Electric Manufacturing Co. will be continued and that manufacturing operations and sales activities will be conducted under the management of the present personnel. The only notable change among the officers of the Franklin Electric Manufacturing Co. has been the election of Walter Cary as president, succeeding the late Jonathan Camp. Both the Franklin Electric Manufacturing Co. and the Westinghouse Lamp Co. are extensive manufacturers of incandescent lamps.

**Economy Fuse & Manufacturing Co.**, Chicago, announce a new line of Economy cutout bases which offers many features of improved construction. In the 0-60 amp. sizes the contacts are secured in recesses formed in the porcelains thereby securing a solid insulating body between the live parts and the surface on which it is mounted by doing away with the waxed counter-bores which are usually on the bottom to fill up the holes made by the screws passing through from underneath. The larger sizes have the contacts stamped from a single piece of metal with a lug attached which makes the completed base much more compact than usual. This line also includes the Economy branch tap straps which should prove very interesting to contractors. By using these branch tap straps seven combinations, which are all that should be required in ordinary construction, are obtained with standard main-line cutout bases. In this way a much smaller stock of bases will suffice to make the contractor's stock complete.

**Diamond Power Specialty Co.**, of Detroit, Mich., under the direction of Robert June, mechanical engineer, has produced a motion picture film, entitled "Coal Is King," for the Ford Motor Co., which is very interesting and of great educational value. This motion picture, which is of vital importance to presidents, managers and chief engineers of power plants, has received the endorsement of a number of administrative engineers throughout the country, and is at present being shown in several states. The film deals with the conservation of coal and handles this situation in a complete and convincing manner. It deals with good and bad methods of coal mining and transportation, also good and bad methods of firing, the use of power plant instruments, such as draft gauges, $CO_2$ recorders, etc. The necessity for keeping the boiler surface clean is properly brought out and pictures of scale and soot removal shown, losses caused by firing the boiler too high or too low, above or below ratings, losses caused by cutting-in standby boilers too early or too late, losses caused by uncovered steam pipes, leaky pipes, steam traps, etc. This picture, in fact, tells the story of coal from the time it is taken out of the ground until it is used in the generation of power. The Ford Motor Co. offers this film to organizations such as the Chamber of Commerce, American Society of Mechanical Engineers, and National Association of Stationary Engineers for exhibition to power plant operators. The Diamond Power Specialty Co., through its acquaintance with power plant engineers, is assisting the Ford company in arranging a schedule of distribution, and all communications relative to date of exhibition should be addressed to Robert June.

**Edison Electric Appliance Co.**, 5660 W. Taylor street, Chicago, has issued revised price lists applicable to General Electric type heating appliances, Hughes electric ranges, ovens and appliances, and Hotpoint appliances, superseding all previous price lists and are subject to change without notice. The company states that owing to the rapidly mounting manufacturing costs and Government restrictions curtailing the amount of material used in the production of electrical appliances it is imperative that this revision be made.

**The Austin Co.**, industrial engineers and builder, Cleveland, Ohio, is distributing Catalog No. 6, entitled "Austin Standard Factory-Buildings in Wood." Acting upon the Government's suggestion to conserve steel and in order that Austin standard factory-buildings may still be available to all essential industries, engineers of the Austin Co. have perfected a series of designs for wood construction covering ten Austin standard types, illustrated and described in the catalog. The dimensions and general characteristics of each type correspond closely to the original Austin standards in steel and are claimed to possess the same advantages as the latter construction, such as speed, permanency and practical adaptability.

**Westinghouse Electric & Manufacturing Co.**, East Pittsburgh, Pa., to provide for the growing demand for advanced research, has erected a research building about a mile from its main works on the Lincoln Highway. Provision is made in the new building to deal with a large variety of experiments in many lines of work, including magnetic insulation, metallographic metallurgy, chemistry-organic and inorganic, furnace combustion, woodworking, illumination, glass blowing, etc. The distinctive features of the building are its plumbing and wire services, arranged in such a way as to enable these services to be brought into any particular laboratory when needed without disturbing any other part of the building. The power house contains motor-generator sets for supplying single-phase, two-phase, and three-phase current at 220 volts, and direct current at 250 volts. A motor-driven air compressor supplies compressed air at 126 lb. pressure and a large motor-driven vacuum pump supplies the necessary house vacuum. A liquid air machine capable of supplying 1½ to 2 litre liquid air per hour is also installed in the main power house. The storage battery is in a separate room in the basement of the power house and consists of a total of 218 cells, so divided that various grouping and combinations may be obtained.

In one end of the basement is the furnace room with a battery of electric furnaces of various types, together with the necessary control for melting, annealing and various metallurgical processes. The woodworking and metal-working shop and storeroom are also in the basement. On the first floor are the main and private offices, the library and the conference room. The remainder of this floor and the second floor are assigned to physical, electrical and magnetic research, while the third floor is devoted to chemical and electrochemical research, illuminating laboratories and a glass-blowing room. While this new laboratory has been occupied for only a comparatively short time, the work already accomplished gives much promise for the future. It is, of course, intended that the fundamental and advance work shall be carried on by this section of the engineering department. Application of new processes and products thus developed, however, are to be carried out by sections more intimate with the works department. As this special research section and others are under one management, men can readily be transferred from the more commercial sections to the laboratory or vice versa as the exigencies in the case demand. The new research building, one of seven laboratories of the company's engineering department, is divided into sections, each with a section head reporting directly to the division engineer.

# Current News

## Weekly Record of Construction Activities—Conventions

### EASTERN STATES.

DEDHAM, MASS.—Cochran Manufacturing Co., 56 Barrett avenue, Malden, has had plans prepared for the construction of a power house, dam and transmission system at Putnam, near Dedham. It is proposed to commence work shortly after the declaration of peace.

FALL RIVER, MASS. — Stevens Manufacturing Co. has completed arrangements for the construction of a one-story electric building, about 20x45 feet in size, at its plant.

BUFFALO, N. Y.—D. T. Kennard Thomas, of New York City, and Peter A. Porter, of Niagara Falls, are planning to dam the river below the falls to produce an estimated 2,000,000 hp.

BROOKLYN, N. Y.—United States Government, Bureau of Yards and Docks, is taking bids for the construction of a large new addition to its power plant "A" at the local navy yards, to cost about $175,000.

BUFFALO, N. Y.—The City Commission is considering plans for the early installation of a new interconnecting telephone system in the various municipal buildings and city departments.

BUFFALO, N. Y.—All machinery in the new steel plant to be constructed by the Mayer & Clarkson Co., Comet avenue, will be electrically driven, with individual motor drive for different large machine tools, etc. The plant will be about 100x250 feet, and will be devoted to the production of cold rolled tool steel, cold rolled shafting, drill rods, and kindred specialties. Alfred L. Mayer is president.

DEPEW, N. Y.—Buffalo & Depew Railway Co. has filed application with the Board of Trustees, Lancaster, for permission to build an extension to its lines in the municipality. William B. Cutter is receiver for the company.

GROTON, N. Y.—Groton Electric Power Corporation has been merged with the Ovid Electric Co.

MOUNT VERNON, N. Y.—Westchester Electric Co. has made announcement that, effective Nov. 15, it would discontinue the operation of its two traction lines in Mount Vernon, extending to North Pelham and New Rochelle, and to Tuckahoe.

NEW YORK, N. Y.—Schultz Electric Co., 18 East Twenty-second street, a New York corporation, has filed notice of dissolution.

NEW YORK, N. Y.—Interborough Rapid Transit Co. has arranged for the issuance of three-year convertible 7% gold notes to the amount of $6,000,000, to provide, in part, for proposed construction work, etc.

NEW YORK, N. Y.—United Electric Light & Power Co., 130 East Fifteenth street, has awarded a contract to the Kenwell Contracting Co., 841 Broadway, for the construction of a one-story power station to be located at Two Hundred and First street and the Harlem river.

NEW YORK, N. Y.—B. Nordrup, 2102 Broadway, is in the market for all kinds of electrical supplies.

NIAGARA, FALLS, N. Y.—Dr. T. Kenard Thomson of New York has recently submitted a plan to the Government for the construction of a large hydroelectric power plant to develop approximately 2,000,000 additional hp. Included in the plan is the construction of a new dam across the Niagara river about four miles below the falls. The project, which will take two years to carry out, is estimated to cost in excess of $50,000,000, and it is held that it will aid in the elimination of ice difficulties at the falls power plants.

NIAGARA FALLS, N. Y.—Star Electrode Co., Buffalo avenue, has had plans prepared for a two-story addition to its plant, about 80x80 feet.

NIAGARA FALLS, N. Y.—Cliff Electric Distributing Co., Canal Basin, affiliated with the Niagara Power Co., has had plans prepared for five electric buildings of brick and reinforced concrete. The structure, it is understood, will be used for substation work, and will be each four-story, about 20x75 feet in size, located at Echota, near Niagara Falls.

PENN YAN, N. Y.—Penn Yan & Lake Shore Electric Railroad will be extended from Branchport to Hammonsport, a distance of 12 miles.

CAPE MAY, N. J.—The United States Government, Bureau of Yards and Docks, has awarded a contract to Cramp & Co., 4 North Eleventh street, for the construction of a one-story power house, about 48x98 feet, to cost $67,000.

DOVER, N. J.—New Jersey Power & Light Co. has contracted with the Hercules Powder Co., Kenville, for furnishing electric energy for lighting purposes for the new bungalows recently erected at this location for its employes' service. About 60 of these new buildings have been erected.

LAKE DENMARK, N. J.—United States Government, Bureau of Yards and Docks, is considering the installation of new lighting systems at the local Government site to cost about $50,000.

NEWARK, N. J.—The Board of Managers of the Isolation Hospital, Soho, has made application to the Board of Freeholders for the installation of a new ash conveying system at the institution.

NEWTON, N. J.—Newton Electric & Gas Co. is said to be planning for the installation of new equipment at its plant, to increase the service supplied for street-lighting purposes.

POMPTON LAKES, N. J.—The Borough Council has passed on final reading the ordinance appropriating $60,000 for the construction of the proposed new addition to the borough electric plant.

VERONA, N. J.—The Essex County Tuberculosis Hospital Board of Managers has had plans prepared for the construction of a group of one-story hospital buildings at the local institution. Considerable new electrical equipment will be required.

MATAWAN, N. J.—The Borough Council has had plans prepared for the installation of a new fire alarm system.

NEWARK, N. J.—The Board of Public Utility Commissioners has granted permission to the Public Service Corporation to issue additional stock to the amount of $1,410,000, to be used for extensions and additions, and to provide further working capital.

NEWARK, N. J.—Ground has been broken by Baker & Co. for the construction of the proposed one-story brick and reinforced-concrete extension to its engine plant in Austin street, estimated to cost $8,400.

NEWARK, N. J.—The Public Service Corporation has announced a donation of $10,000 to the state fund of the United War Workers Campaign.

ALLENTOWN, PA.—Lehigh Navigation Electric Co. has completed arrangements for the construction of the proposed power plant addition at Hauto, Pa., estimated to cost in excess of $500,000. The Phoenix Construction Co., 81 Broadway, New York, is the contractor. J. B. Crane is vice-president.

BUTLER, PA.—Imbrie Coal Co. has commenced foundation work for the construction of a power house at its properties at Etnaria, Pa. The structure, which will be about 40x65 feet in size, is estimated to cost $10,000.

CONNELLSVILLE, PA.—Western Maryland Railway Co. has awarded a contract for the construction of a boiler plant at its local properties.

PHILADELPHIA, PA.—Swift & Co., Ninth and Noble streets, have awarded a contract to Monaghan & Losse, Inc., 3016 Chestnut street, for alterations and improvements in the boiler plant at its works, to cost about $4,000.

PHILADELPHIA, PA. — American Insulation Co., Roberts and Stokly streets, has awarded a contract to the William Steele & Sons Co., 1600 Arch street, for the erection of the proposed one-story brick boiler plant and engine room, about 46x48 feet, estimated to cost $20,000.

SHARPSVILLE, PA. — Sharpsville Boiler Works is making rapid progress

in the construction of a one-story power house addition at its plant, estimated to cost $80,000. The Independent Bridge Co., 829 Beaver street, Pittsburgh, is the contractor.

PITTSBURGH, PA.—The Government has cancelled its contracts with the Duquesne Light Co. for the construction of the $16,000,000 power plant at Cheswick, according to word received from the company.

BALTIMORE, MD.—Mt. Vernon-Woodberry Mills, 506 Continental building, let a general contract to Gladfelter & Chambers, 36th street and Roland avenue, Baltimore, for power house. Plans have been prepared by Joseph Evans Sperry, Calvert building, Baltimore.

INDIAN HEAD, MD.—In connection with the extensive work to be inaugurated at the local Government site, plans have been prepared for the installation of a telephone system to cost approximately $40,000.

PETERSBURG, VA.—Petersburg & Appomattox Electric Railway will be extended to Prince George Courthouse. J. L. Vaughan, Petersburg, president.

QUANTICO, VA.—Bureau of Yards and Docks, Washington, D. C., plans to construct a $45,000 electric generating station.

CHARLESTON, W. VA.—Kanawha Colliers Co., 207 Charleston National Bank building, is in the market for power plant machinery.

HARTLAND, W. VA.—Hartland Power Co. is making rapid progress in the construction of the proposed extension to its Elk River transmission line.

WHEELING, W. VA.—$6,000 will be expended for improvements to the Wheeling Electric Light System.

FAYETTEVILLE, N. C.—Herbert L. Jones, Richmond, Va., has applied for a street railway franchise in Fayetteville. The application was referred to a committee of the Board of Aldermen.

MURPHY, N. C.—The town of Murphy will expend $25,000 installing a hydroelectric plant. Address town clerk.

CHARLESTON, S. C.—In connection with the remodeling of its building on East Bay street, the Western Union Telegraph Co. is planning for the installation of new equipment, including telegraph instruments, etc., at a cost of $50,000. W. O. Gaffney is local manager.

COLUMBIA, S. C.—Fire, caused by an explosion, recently destroyed the boiler plant at the works of the local cotton gin at Eastover, near Columbia.

ELLOREE, S. C.—Elloree Electric Light Co.'s plant recently suffered a loss by fire of $500. Address manager.

ATLANTA, GA.—Southern Iron & Equipment Co., 217 Grant building, Atlanta, Ga., is in the market for 140 to 175 hp. oil or Diessel type engine, direct connected to 220-volt, 3-phase, 60-cycle generator. The company could use higher voltage. Also 80 to 90 hp. oil or Diessel type engine suitable to connect to generator.

ROME, GA.—The City Commission is considering plans for the installation of new equipment in the local pumping station for the generation of electric energy for power and lighting purposes.

## DATES AHEAD.

American Society of Mechanical Engineers. Annual meeting, New York City, Dec. 3-6. Secretary, Calvin W. Rice, 29 W. 39th street, New York, N. Y.

Electrical Supply Jobbers Association. Semi-annual meeting, Cleveland, Ohio, Dec. 9, 10 and 11. General secretary, Franklin Overbagh, 411 S. Clinton street, Chicago.

Florida Engineering Society. Annual meeting, Jacksonville, Jan. 5, 1919. Secretary, J. R. Benton, Gainesville, Fla.

American Institute of Consulting Engineers, Inc. Annual meeting, New York City, Jan. 13, 1919. Deputy secretary, B. Etchelle, 35 Nassau street, New York City.

Northern White Cedar Association. Annual meeting, Milwaukee, Wis., Jan. 21, 1919. Secretary, N. E. Boucher, 702 Lumber Exchange, Minneapolis, Minn.

Western Association of Electrical Inspectors. Annual meeting, Chicago, Ill., Jan. 28-30, 1919. Secretary, W. S. Boyd, 175 West Jackson boulevard, Chicago, Ill.

Oklahoma Utilities Association. Annual meeting, Oklahoma City, Okla., Feb. 13, 14 and 15. Secretary, H. A. Lane, Oklahoma City, Okla.

New Mexico Electrical Association. Annual meeting, Albuquerque, N. Mex., Feb. 17-19. Secretary-treasurer, Charles E. Twogood, Albuquerque, N. Mex.

## NORTH CENTRAL STATES.

EAST PALESTINE, OHIO.—Novelty Clay Co. is now engaging in the manufacture of electric porcelain and gas supplies for the Westinghouse Electric & Manufacturing Co.

HAMILTON, OHIO.—A $2,000,000 tractor plant on the Miami river, owned by Henry Ford, of the Ford Motor Co., will be the first of numerous factories throughout the United States which will utilize water power. The Hamilton plant will develop from 4,000 to 5,000 hp.

MASSILLON, OHIO. — Massillon Electric & Gas Co. is ready to construct an addition to its present structure in South Erie street. The material is on the ground and work will be started as soon as enough employes can be obtained. The addition will cost between $35,000 and $40,000, and will be constructed of brick, steel and concrete. The plant, which was to have been built to Bolivar, will be built some time in the future.

ST. MARY'S, OHIO.—A $20,000 bond issue has been authorized to meet extraordinary war-time cost of labor and material for improving light and water system. Address Harvey C. Smith, manager.

INDIANAPOLIS, IND.—The Indianapolis Board of Public Works has received a bid from the Welsbach Street Lighting Co. of America for supplying and maintaining not less than 1000 street lamp posts in the part of Indianapolis bounded on the west by Talbott and North Pennsylvania streets, on the south by St. Clair street, on the east by the Monon railroad, and on the north by the Fall Creek boulevard. The annual cost for each lamp, minus the cost of gas, would be $14.32, under the terms of the bid.

LAFAYETTE, IND.—Ladoga Light Co. has filed a petition with the Indiana Public Service Commission asking an increase in light rates. Present rates range downward from the primary rate of 10 cents a kw-hr. The company leaves it to the commission to determine what shall be a just rate.

LAFAYETTE, IND.—Northern Indiana Gas & Electric Co. has filed a petition with the Indiana Public Service Commission asking for a temporary surcharge to electric power bills at Lafayette and West Lafayette.

NORTH MANCHESTER, IND.—Browne Mills Electric Co. has been granted a permit by the Indiana Public Service Commission to issue $43,000 bonds.

ROCHESTER, IND.—The Indiana Public Service Commission has authorized the United Public Service Co. to increase its charge 1 cent a kw-hr. for electric current. The commission denied the company its petition for an increase in general lighting rates.

CHAMPAIGN, ILL. — Urbana & Champaign Railway, Gas & Electric Co. has filed a petition with the Illinois Public Utilities Commission asking for a 10-cent fare between Champaign and Urbana, adjacent cities, the business centers of which are two miles apart. The company proposed to sell four tickets for a quarter if the increase is allowed.

FARMINGTON, ILL.—Plans are now being completed by the Central Illinois Light Co. for building a transmission line from Farmington to Gilchrist, which will connect with the power line of the Canton Gas & Electric Co. at that place. The project has been sanctioned by the Public Utilities Commission and construction work will be started immediately. This will supply an emergency source of power for both companies which are furnishing the numerous coal mines in North Fulton with electricity. Address Secretary E. E. Corkey, 316 S. Jefferson street, Peoria, Ill.

GALENA, ILL.—A new ore body, to be known as the Big Dick mine, has been located northeast of Cuba City. Its electrical requirements will be supplied by the Interstate Light & Power Co. (subsidiary of Northern States Power Co.), through an extension connecting with the Zinc Mill Mining Co.'s lines. The extension will be financed by the mining company and will be completed and the load served by the Interstate company in approximately 90 days.

LINCOLN, ILL.—City Commission has decided to build an extension of the Lincoln Municipal Railway to the North Mine and a resolution favoring such construction has been placed on file. The work will not be started until the reconstruction of the Union and Eighth street track is completed. The track to the North Mine will be laid on the west side of the street, paralleling the pavement, the City Commission saving the expense of tearing up the pavement.

MADISON, WIS.—The city asks right to erect poles for car wires. The legislature a few years ago appropriated $17,500 to the city for the improvement of State street. The improvements were authorized to include asphalt paving, the removal of all wooden

electrical and telephone poles, and the substitution of ornamental poles, where necessary. All of this has been done with the exception of these poles of the street railways company. Address City Attorney William Ryan.

DEERWOOD, MINN. — Cuyuna Range Power Co. is planning to move to Ironton. The company is making connections to town of Motley and will install lamps and motors and furnish electricity.

DULUTH, MINN.—McDougal-Duluth Co., 15th avenue, contemplates an addition to shipbuilding plant, the estimated cost of which is $750,000.

MINNEAPOLIS, MINN.—The sales department of the Minneapolis General Electric Co. during the week ended Nov. 8 accepted 315 new customers with 173 kw. of lighting and 93 hp. in motors. New business connected to the company's lines shows an increase of 150 customers with 110 kw. of lighting and 185 hp. in motors. Electric energy output was 6.05% greater than during the corresponding week last year.

NEOLA, IOWA.—The Town Council has authorized the issue of $10,000 5½% electric light bonds. Address town clerk.

KANSAS CITY, MO.—Kansas City Light & Power Co. will erect a substation on 12th street, near Bristol avenue, at an estimated cost of $15,000. Address secretary.

## SOUTH CENTRAL STATES.

LOUISVILLE, KY.—The Commercial department of the Louisville Gas & Electric Company during the week ended Nov. 9, accepted 37 new electric light and power customers with 18 kw. of lighting and 32 hp. in motors. New business connected to the company's lines shows an increase of 23 customers with 44 kw. of lighting and 160 hp. in motors. Output of electric energy was 16.5% greater than during the corresponding week last year.

WHITESBURG, KY.—Elkhorn Kellico Coal Co. will build an addition to power plant.

ANNISTON, ALA.—Woodstock Operating Corporation is in the market for a lifting magnet, complete with electrical generating equipment; state size, also point of shipment.

BIRMINGHAM, ALA. — Birmingham Railway, Light & Power Co. is considering improvements to its plant.

MONTGOMERY, ALA. — Isadore Newman & Sons, New Orleans, La., have purchased the properties of the Montgomery Light & Traction Co., including the electric lighting plant and street railway, at a reported consideration of about $2,000,000. The new owners will expend about $250,000 in rehabilitating street railway system and making other improvements.

WAYNE, ALA.—Plans are being made to improve the electric light plant and install new machinery to cost about $25,000.

CLARKSDALE, MISS.—The City Commissioners are planning for the installation of new boiler equipment in its water and light plants.

COTTER, ARK.—Dixie Dam & Power Co. will establish a hydroelectric plant on the White river.

FAYETTEVILLE, ARK.—This city plans installation of electrically-driven pump at White river pumping station to cost $6,000.

FORT SMITH, ARK.—New business secured by the Fort Smith Light & Traction Co. includes 85 hp. in motors for the Arkansas Coffin Co.

HAVANA, ARK.—Kyle & Co. will install an electric light plant to supply current for the city.

ALEXANDRIA, LA. — Welman Bradford, engineer, is interested in planning to construct hydroelectric plant, irrigation and navigation systems; divert water of Red river to Gulf.

MOORINGSPORT, LA.—Oil City Electric Light & Power Co., Oil City, is planning for the construction of an addition to its plant to furnish electric energy to Mooringsport and vicinity.

OIL CITY, LA.—Oil City Electric Light & Power Co. will erect an addition to its plant to supply additional light and power to towns of Oil City and Mooringsport.

HOMINY, OKLA.—The $50,000, 6% water and sewer bonds recently voted have been approved and will be offered for sale at an early date.

AUSTIN, TEX.—J. E. Farnsworth, vice-president of the Southwestern Telegraph & Telephone Co. in Texas, stated that the company would build in Austin as soon as possible.

BEAUMONT, TEX.—J. E. Farnsworth, representing the Southwestern Telephone Co., stated at a meeting of the city council last week that the two systems would soon be merged, this company buying the interest of the other company.

CANYON, TEX.—Negotiations were completed Nov. 6 whereby A. E. Bent, of Denver, Colo., sold the entire buildings and franchise of the Canyon Power Co. to A. J. Arnold.

RANGER, TEX.—The Chamber of Commerce is promoting plans for the establishment of an electric light system.

## WESTERN STATES.

HOQUIAM, WASH.—In connection with improvements being made at the plant of the Gray's Harbor Lumber Co., an addition is being erected at the power plant. Two new high pressure boilers, a 1000-kw. and 750-kw. turbine will be installed, with other equipment.

SEATTLE, WASH.—The city of Seattle has voted to purchase the street railway system of the Puget Sound Traction, Light & Power Co. for the sum of $15,000,000. The council will also immediately take up the question of the purchase of the Seattle & Rainier Valley Railway lines, including the Renton interurban. Closing the traction deal makes available a loan of $339,000 from the Government to complete the elevated line to the west side.

SEATTLE, WASH.—Smelters Steel Co., White building, will construct a smelter on seventh slip of the commercial waterway district No. 1. The specifications include an electric furnace. Address Francis W. Grant, architect.

GLENDALE, CAL.—Application has been made to the State Railroad Commission by the Southern California Edison Co. to dispose of the portion of its system furnishing electric energy to the city to the city officials. The property to be sold was formerly a section of the system of the Pacific Light & Power Corporation, and is understood to be held at about $35,000.

HOLTVILLE, CAL.—Holton Power Co. is considering plans for extensive improvements and additions to its Holtville auxiliary plant estimated to cost approximately $75,000. It is understood that the company is negotiating with the Imperial Irrigation District for the use of 150 second feet of water daily, continuous flow.

OCEANSIDE, CAL. — The City Trustees have recently completed arrangements for the installation of electrically-operated machinery to replace the steam motive power heretofore used in the pumping of water from the San Luis river to the reservoirs. Contract has been awarded to the San Diego Consolidated Gas & Electric Co. for furnishing electric energy for operation.

SAN DIEGO, CAL.—San Diego Electric Railway Co. has recently commenced the construction of an extension to its traction system to the local shipbuilding plant, to provide transportation facilities for workers engaged in this section. It is understood that the Government will finance the work, which is estimated to cost $50,000.

SAN FRANCISCO, CAL.—Pacific Gas & Electric Co. will issue $5,000,000 in bonds. The proceeds of the stock or bond sales are to be used to reimburse the company's treasury for capital expenditure made before May 1, 1918, and to finance future construction work.

## PROPOSALS

ELECTRIC LIGHT FIXTURES.—Bids will be received Nov. 27 at the Supervising Architect's office, Treasury Department, Washington, D. C., for installing electric light fixtures in post offices at Burlington, N. C., El Paso, Tex., Chadron, Neb. and Glenwood Springs, Colo. Address Supervising Architect Wetmore, Washington, D. C.

POWER HOUSE. — The United States Government, Navy Department, is taking bids for the construction of a one-story addition to its power house substation Building No. 45 at the local navy yards, Philadelphia, Pa. (specification 3252).

INCINERATOR PLANT EQUIPMENT, ETC.—Bids will be received at the office of the General Purchasing Officer, The Panama Canal, Washington, D. C., for furnishing by steamer, free of all charge, on dock at either Cristobal (Atlantic port) or Balboa (Pacific port), Canal Zone, Isthmus of Panama, the following: Equipment for incinerator plant, overhead cranes, engine lathe, etc. Circular No. 1239.

POWER PLANT.—Bureau of Yards and Docks, Navy Department, C. W. Parks, Washington, D. C., is receiving bids for an electric light power plant to be erected at Norfolk, Va., at a cost of $6000.

# Recent Patents

## *Selected and Summarized by Albert Scheible, Patent Attorney, 79 West Monroe Street, Chicago, Illinois*

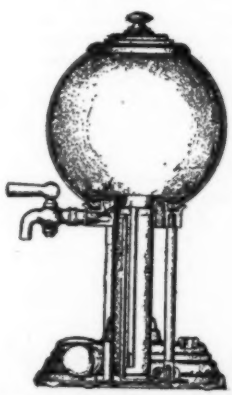
*A series of brief comments on some of the recently issued electrical patents which appear to be of particular interest to our readers, the number after each heading being that of the United States patent to which the summary relates. Any correspondence regarding such patent matters should be sent direct to Mr. Scheible at the above address.*

**Measuring Telephone Service** (1,281,251).—A pay-station apparatus is controlled by a relay and a talking circuit is maintained closed during the talking by this relay, as part of the system devised by Roy C. Gifford, of Chicago. The patent was assigned to the Automatic Electric Co.

**High Conductivity Solder** (1,281,126).—A copper alloy fusible at a higher temperature than the solder is mixed with the solder, the mixture is brought to a red heat and is then cooled quickly to crystallize the copper into a fine state. Patented by Alexander P. Bevan, of Tavistock, England.

**Coating Metals Protectively** (1,281,108).—To prevent electrolytic action between dissimilar metals when one is used as a protective coating for the other, Francis A. Vaughn, well-known electrical engineer of Milwaukee, Wis., first applies a coating of binder and electrolytic insulating material to the base metal, and then sprays the other metal in molten form upon this insulating coating.

**Electric Water Heaters** (1,281,157 and 1,281,158).—Two patents relating to fluid heaters, both assigned by William S. Hadway, Jr., to the Cutler-



No. 1,281,158.—Electric Water Heater.

Hammer Mfg. Co. The second patent shows a soda fountain type of heater.

**Motor Starting and Releasing** (1,280,147).—For alternating currents, Lynde Bradley and Harry L. Bradley have designed this mechanism for simultaneously closing connections from a single electrical circuit through a set of polyphase conductors. The mechanism includes a support from which the circuit-closing devices are operated, a locking device for holding the support in its circuit-closing position, and a set of lock-releasing devices each controlled by the current in one phase of the circuit.

**Motor Control for Vehicles** (1,280,624).—E. F. W. Alexanderson (of the General Electric Co.) connects induction motors in parallel, controls the speeds of the motors simultaneously, and provides independently adjustable transformers for supplying current to the stator windings of the numerous motors.

**Demagnetizing Apparatus** (1,281,084).—A direct current is periodically reversed by this apparatus and means are provided for uniformly varying the magnitude of this periodically reversed current. The patent was assigned by Thomas Shaw (of Hackensack, N. J.) and Clement J. Koukol (of Elmhurst, N. Y.) to the American Telephone & Telegraph Co.

**Indicator for Flatirons** (1,280,709).—To prevent electrically-heated flatirons from being inadvertently left on the circuit, Edward L. Glass (of Chicago) mounts a visual indicator on the top of the iron. This consists of a resistance wire under a transparent pane, through which the glow of the wire is visible as long as the current is on the iron.

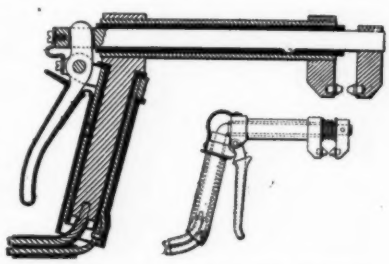
**Wireless Signaling** (1,280,768).—In this wireless receiving system, the received waves are impressed upon the rigid plate and grid circuit, while an alternating current of a slightly different frequency from that produced by the received waves is impressed on the plate circuit by means independent of the electron-discharge device which includes the plate and grid circuits. The patent was assigned by Irving Langmuir to the General Electric Co.

**Resistance Element** (1,281,218).—A coil of resistance wire is wound on a core of soft insulating compound and a covering of insulating material is pressed on the coil, so that the core and the covering co-operate in maintaining the turns of the wire spaced apart. This covering is made of alundun, powdered asbestos, and an alkaline silicate, and the resulting resistance unit is baked to expel both moisture and combustible material. The patent was assigned by Edward Schwartz, of New York City, to the Manhattan Electrical Supply Co., of Jersey City, N. J.

**Lighter for Oxyacetylene Torches** (1,281,036).—In this appliance Arthur M. Lofstrom (of Cambridge, Minn.) provides sparking points mounted on a spool carrying a winding.

**Focusing Sockets** (1,280,926 to 1,280,928). — Three different lamp sockets suitable for focusing lamps in headlights are disclosed in these patents to Overton Winston, of Minneapolis, Minn.

**Electric Welding Apparatus** (1,280,818).—When the parts which are to be spot-welded to each other are too large to be conveniently handled with the usual or stationary welding apparatus, John P. Nikonow (of Balti-



No. 1,280,818.—Portable Spot-Welding Outfit.

more) uses the portable welder shown in our illustration. This is shaped like a revolver, with one electrode carrier sliding inside the other, so that the electrodes can be pressed against opposite sides of the work by squeezing the handle. An alternative form is also shown in the illustration.

**Automatic Telephone Exchange** (1,280,324).—A simple two-wire trunk extending between two central offices forms an important part of this system, for which the patent was assigned by Arthur B. Sperry (of New York City) to the Western Electric Co.

**Treating Tungsten Filaments** (1,280,704).—According to this patent, assigned to the General Electric Co., by Carl T. Fuller, of Nutley, N. J., the mechanical properties of the wire are improved by heating it at least to a red heat in an oxidizing atmosphere.

**Packing Dry Batteries** (1,280,657).—To pack dry batteries economically for storing and shipping them, Charles F. Burgess assembles them close to each other in horizontal layers with disks of yielding insulating materials between the layers. The weight of the next higher layer then causes the projecting terminals of the batteries to be imbedded in the insulating material, thereby anchoring the batteries and also insulating the terminals. The patent was assigned to the Burgess Battery Co., of Madison, Wis.

# Personal

## C. W. McKay Joins Cooley & Marvin Co.—Cyrus A. Whipple Appointed Foreman of Puget Sound Navy Yard

WILLIAM DODS, president of the Carbon Transit Co., Allentown, Pa., and Grant S. Muschlitz have been appointed receivers for the company by Judge Barber.

AUSTIN P. PALMER, formerly an electrical consulting engineer in New York City, has become associated with the Sperry Gyroscope Co., Brooklyn, N. Y., in the capacity of electrical tester.

GEORGE M. KEENAN, formerly chief engineer for the Little Rock Railway& Electric Co., Little Rock, Ark., has become identified with the Lehigh Navigation Electric Co., of Allentown, Pa.

FRANK C. SPENCER, until recently efficiency engineer with the Western Electric Co., Chicago, is now connected with the Colt Patent Fire Arms Co., Hartford, Conn., in the capacity of superintendent of the Browning gun department.

F. O. EMERY recently resigned his position as superintendent of the water and light department of the City of Reedsburg, Wis., to become superintendent and electrical engineer for the Janesville Electric Co., Janesville, Wis. Mr. Emery assumed his duties with the Janesville company on Nov. 1.

CYRUS A. WHIPPLE, who since the beginning of the war has been engaged on large developments along shipbuilding lines, was recently appointed power plant foreman of the United States Navy Yard on Puget Sound, at Bremerton, Wash., in charge of all electrical, hydraulic, air and other power utilized at the navy yard and auxiliary stations. He was graduated from the University of Washington in 1899 and from Cornell University in 1903, and since that time has been engaged in engineering work. He was one of the engineers on the construction of the Electron plant of the Puget Sound Traction, Light & Power Co., and later worked out the consolidation of the navy yard power system which he is now operating. He subsequently assisted in building the Fraser Valley electric interurban system extending from Vancouver to Chilliwack, B. C. On completion of this work he became superintendent of operation for the Mount Hood Railway, Light & Power Co., Portland, Ore., until it was purchased by the Portland Light & Power Co., when Mr. Whipple opened a private office in Portland. When the Southern Pacific company began the electrification of its Willamette Valley system he was appointed chief assistant to the electrical engineer and later was appointed superintendent of light and water for the city of Eugene, Ore. Resigning his position with the city, he became electrical and mechanical engineer for the Public Service Commission of Washington, in which capacity he was engaged in appraisal of all the large companies of the state.

E. P. CHALFANT, formerly eastern division manager of the Detroit Anderson Electric Car Co., with offices in New York City, is now general manager of the Automotive Products Corporation of New York City.

MAURICE COSTER of the Westinghouse Electric Co. and M. A. OUDIN of the General Electric Co., New York, were present at the fifth annual meeting of the National Foreign Trade Council, held at the Biltmore Hotel on Nov. 8.

THOMAS W. SHELTON, who resigned two weeks ago as general superintendent of the Kankakee and Urbana Traction Co., Urbana, Ill., has accepted the general superintendency of the Illinois Central Electric Railway Co., Canton, Ill.

A. O. KUHMSTED, vice-president of the Gregory Electric Co., Chicago, has been elected president of the Hinsdale (Ill.) Golf Club. It goes without saying that Mr. Kuhmsted will fill this office and carry the honor with his customary skill.

T. K. STEVENSON, formerly sales manager of the St. Louis branch of the Western Electric Co., has been transferred to the Government department at New York where he will do special work. Mr. Stevenson is succeeded by George Corrao, who has been appointed assistant sales manager of that house.

WALTER S. GIFFORD, who has so ably served as director of the Council of National Defense, has tendered his resignation and is the first prominent business man to retire from war service since the cessation of hostilities. Mr. Gifford returns to the American Telephone & Telegraph Co. as controller. His place on the council has not been filled, Secy. Grosvenor B. Clarkson assuming his duties.

CHARLES W. McKAY, formerly connected with McMeen & Miller, Chicago, is now with the industrial engineering firm of Cooley & Marvin Co., Boston, Mass., which is specializing on both industrial and public utility appraisals. In the capacity of appraisal engineer, Mr. McKay will have full charge of this phase of work. He has been engaged in telephone engineering and appraisal work since his graduation from Sibley College of Mechanical Engineering, Cornell University, in 1906. In July, 1906, he entered the employ of the New York & New Jersey Telephone Co. (now the New York Telephone Co.), and after serving a brief apprenticeship in the maintenance department was assigned to the plant engineering department. In 1909 he was appointed engineer for the North Brooklyn district, having charge of the preparation of plans and estimates for all outside construction work within the district. In 1910, at the time the New York Telephone Co. absorbed all of the up-state Bell companies, Mr. McKay was assigned to special work and spent the greater part of the following year in inspecting a number of the larger of the company's newly-acquired properties, and in 1911 was appointed engineer for the Borough of Queens. During the year 1912-13, Mr. McKay was associated with Henry Floy in the capacity of assistant engineer, and while holding this position he was identified with several important appraisal cases. In the summer of 1913 he became engineer to the McCall & Clark Co., efficiency expert of New York, and in October, 1913, affiliated himself with McMeen & Miller, Chicago. While with this well known engineering firm, Mr. McKay spent the major portion of his time on problems involving the appraisement of public utility properties. He later engaged in valuation work for the Central Union Telephone Co., and continued in this capacity until his recent appointment with the Cooley & Marvin Co. He is a prolific writer on appraisal subjects and has contributed extensively to the technical press. Mr. McKay has prepared a series of articles on rate appraisal, and has recently been engaged to conduct a department on rate appraisals and valuation for the ELECTRICAL REVIEW.

LOUIS STEINBERGER, president and general manager of the Electrose Manufacturing Co. of Brooklyn, N. Y., is one of the electrical men who may easily be considered one of the essential factors in the winning of the war. Under his direction this company turned out a large quantity of electrical equipment for use on the submarines, chasers, and other craft of our navy which won high commendation of the Government officials. The insulators manufactured by this company are considered among the best and are the standards in the Army and Navy.

In many other ways Mr. Steinberger has proven himself a real patriot. In the Fourth Liberty Loan campaign his company and its employes subscribed $73,000. To stimulate the purchase of bonds every employe who purchased a bond, regardless of its value, was given a $50 bond by the company. Another item worthy of mention was his purchase for $2500 of a program, autographed by President Wilson for the benefit of the Naval Relief Society.

### Obituary.

WILLIAM R. EDWARDS, Allentown, Pa., an official of the Lehigh Valley Transit Co., died Nov. 8, aged 54 years.

ROBERT D. J. FORD, 23 Burnet street, Newark, N. J., manager of the local Postal Telegraph Cable Co. office, died Nov. 11, aged 55 years.

MARTIN I. SMITH, a civil engineer employed by the Public Service Commission, New York, died Nov. 8, at his home at Port Washington, L. I., in his twenty-ninth year.

# *After the War, What ?*

*XII.*

## *Restoration—*

Standing on the threshold of a peace restored, we must pray that out of the epic experience of the great conflict something more than the stern negative of our victory shall be preserved for the time to come, something positive of good, something of that divine light of men's heroic sacrifice which shone out in the darkest hour, something of new strength and understanding of life and of human potentialities.

We have before us now a tremendous task of restoration. America is in a more fortunate situation than the nations of Europe; yet to return our resources to the channels of peace, to free our institutions from the hasty improvisations of war emergency, and to protect them from the effects of forced and abnormal application, is a task which will test the wisdom and character of our leaders and our people.

THIS little classic, from an editorial in the Chicago Tribune, should appeal with especial force to men of the electrical industries—men who played so large a part in winning the war and who will do even more in equipping the world for peace.

*C. A. Tupper, President* . CHICAGO
INTERNATIONAL TRADE PRESS, Inc.

# Financial News

## Ocean Cable Systems.

Preliminary figures of the forthcoming quinquennial report on the ocean cable systems of the United States have been given out by Director Sam L. Rogers, of the Bureau of Census, Department of Commerce. They were prepared under the supervision of Eugene F. Hartley, chief statistician for manufactures. The companies making up the Ocean Telegraph totals for 1917 are, as in 1912: Central & South American Telegraph Co., Commercial Cable Co. of Cuba, Commercial Cable Co. of New York, Commercial Pacific Cable Co., Mexican Telegraph Co. and United States and Hayti Telegraph & Cable Co. The statistics relate to the years ending Dec. 31, 1917, 1912 and 1907, and are subject to such revision as may be necessary after further examination of the original reports. Among ocean cables systems there is one system operated by a land telegraph company, but as details for this were not segregated in the combined report submitted, they could not be included in the statistics for land telegraph systems. The financial statistics concern to some extent operations in foreign countries and statistics of merely holding companies and of Federal Governmental cables are excluded.

The figures show that for the five years, 1907 to 1912, as well as for 10 years, 1907 to 1917, there were substantial gains. During the five years the miles of cable increased 4759, or 7%; during the ten years the increase was 26,134, or 56.4%. The gain in number of cable messages was 609,948, or 10.4%, for the five years, and 581,911, or 9.9%, for the ten years. During the five years the gain in gross income from ocean cable telegraph traffic was $7,597,272, or 94.2%; and in net income $3,554,022, or 120.4%. The ten year gain in these respects was $8,324,790, or 113.4%, and $2,477,795, or 61.5%, respectively. From the net income there was appropriated as provided for in such cases, according to the newly introduced accounting system of the Interstate Commerce Commission, $235,101 as charges for sinking fund and for appropriations for construction. In addition to the dividends declared from net income, an additional sum was declared from accumulated surplus and a considerable amount of stock was issued as stock dividends.

The amount of capital stock outstanding in 1917 was $60,900,000, or 9.8% greater than in 1912. The gain in this respect during the 10 years was $8,100,000, or 15.3%. The number of employes, salaried and others, increased 310, or 18.7%, during the five years, and their total salaries and wages $597,337, or 51.2%. For the 10 years the increase in number was 759, or 62.9%, and in salaries and wages $849,268, or 92.8%.

## Government to Loan Philadelphia Electric $6,000,000.

A loan of $6,000,000 will be made by the Government to the Philadelphia Electric Co. for the construction of a power plant. This represents 40% of the outlay involved in the extension and the other $9,000,000 will be financed by the company. A tentative contract has been agreed upon by the United States Shipping Board and the loan will be made through the Emergency Fleet Corporation.

## Dividends.

Federal Utilities Co., Inc., has declared a quarterly dividend of 1½% on preferred stock, payable Dec. 2 to stock of record Nov. 15.

Colorado Power Co. has declared a quarterly dividend of ½%, payable Jan 15 to stock of record Dec. 31; also a quarterly dividend of 1¾% on preferred stock, payable Dec. 16 to stock of record Nov. 30.

General Electric Co. has declared a dividend of 2 shares of stock and $2.00 in cash, payable Jan. 15 to stock of record Dec. 15.

The Bright Star Battery Co., 210 Hudson street, New York, has filed a schedule in bankruptcy showing liabilities of $97,429 and assets of $116,220, the latter consisting of stock, machinery and current accounts.

The Electric Bond & Share Co., 71 Broadway, New York, is issuing a "Monthly Service Letter" for its employes. The latter is mimeographed, averaging from eight to ten pages and reprints a number of letters received from employes of the company now at the front, as well as general comments relating to the war.

## Earnings.

### BYLLESBY PROPERTIES.

Gross and net earnings of Byllesby combined properties for the month of September, 1918 and 1917, and for the year ended Sept. 30, 1918 and 1917, are shown below:

| Month of September— | 1918. | 1917. |
|---|---|---|
| Gross earnings | $1,813,781 | $1,482,995 |
| Net earnings | 624,220 | 618,488 |
| Year ended Sept. 30— | | |
| Gross earnings | 22,056,948 | 18,595,767 |
| Net earnings | 8,592,205 | 8,642,300 |

### FORT WORTH POWER & LIGHT.

Fort Worth Power & Light Co. reports for September:

| | 1918. |
|---|---|
| Gross earnings | $ 110,208 |
| Operating expenses, including taxes | 60,287 |
| Net earnings | 49,921 |
| Total income | 51,180 |
| Balance after charges | 35,912 |
| 12 months: | |
| Gross earnings | 1,258,584 |
| Operating expenses, including taxes | 679,102 |
| Net earnings | 579,482 |
| Total income | 582,476 |
| Balance after charges | 436,420 |

### SOUTHWESTERN POWER & LIGHT.

Gross and net earnings of properties controlled by Southwestern Power & Light for September compare as follows:

| September: | 1918. | 1917. |
|---|---|---|
| Gross earnings | $ 547,203 | $ 395,473 |
| Net earnings | 194,297 | 189,748 |
| 12 months: | | |
| Gross earnings | 5,427,385 | 4,512,302 |
| Net earnings | 2,071,156 | 2,085,821 |

### UNITED LIGHT & RAILWAY.

Consolidated earnings for the 12 months ended Aug. 31:

| | |
|---|---|
| Gross | $8,778,777 |
| Net after taxes | 2,670,516 |

### TEXAS POWER & LIGHT.

Texas Power & Light Co. reports for September:

| | 1918. |
|---|---|
| Gross earnings | $ 326,820 |
| Expenses and taxes | 218,959 |
| Net earnings | 107,861 |
| Total income | 107,967 |
| Balance after charges | 53,054 |
| 12 months: | |
| Gross earnings | 3,102,880 |
| Expenses and taxes | 2,047,902 |
| Net earnings | 1,054,978 |
| Total income | 1,055,106 |
| Balance after charges | 423,814 |

### UNITED LIGHT & RAILWAYS.

Comparative consolidated earnings statement of the company and its subsidiary corporations for 12 months ended Aug. 31 follows, with comparisons:

| | 1918. | 1917. |
|---|---|---|
| Gross earnings all sources | $8,778,777.08 | $7,269,274.23 |
| Net earnings after taxes | 2,679,316.37 | 2,766,111.81 |
| Balance after interest | 1,016,145.19 | 1,196,790.56 |
| Dividends on preferred stock | 607,698.50 | 602,723.50 |
| Balance | $ 408,446.69 | $ 594,067.06 |

### WEEKLY COMPARISONS OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

| Public Utilities— | Div. rate. Per cent. | Bid Nov. 12. | Bid Nov. 19. |
|---|---|---|---|
| Adirondack Electric Power of Glens Falls, common | 6 | 12 | 12 |
| Adirondack Electric Power of Glens Falls, preferred | 6 | .. | .. |
| American Gas & Electric of New York, common | 10+extra | 98 | 100 |
| American Gas & Electric of New York, preferred | 6 | 39 | 43 |
| American Light & Traction of New York, common | .. | 240 | 237 |
| American Light & Traction of New York, preferred | 6 | 97 | 98 |
| American Power & Light of New York, common | 4 | 40 | 40 |
| American Power & Light of New York, preferred | 6 | 68 | 68 |
| American Public Utilities of Grand Rapids, common | .. | 15 | 15 |
| American Public Utilities of Grand Rapids, preferred | 7 | 40 | 38 |
| American Telephone & Telegraph of New York | .. | 108 | 105 |
| American Water Works & Elec. of New York, common | .. | 7½ | 7 |
| American Water Works & Elec. of New York, particip | 7 | 14 | 14 |
| American Water Works & Elec. of New York, first preferred | .. | 67 | 68 |
| Appalachian Power, common | .. | 2 | 2 |
| Appalachian Power, preferred | 7 | 18 | 18 |
| Cities Service of New York, common | +extra | 305 | 293 |
| Cities Service of New York, preferred | 6 | 82 | 81 |
| Commonwealth Edison of Chicago | 8 | 110 | 118 |
| Comm. Power, Railway & Light of Jackson, common | .. | 26 | 26 |
| Comm. Power, Railway & Light of Jackson, preferred | 6 | 50 | 51 |
| Federal Light & Traction of New York, common | .. | 7¼ | 7¼ |
| Federal Light & Traction of New York, preferred | .. | 35 | 35 |
| Illinois Northern Utilities of Dixon | 6 | .. | .. |
| Middle West Utilities of Chicago, common | 2+extra | 27 | 27 |
| Middle West Utilities of Chicago, preferred | 6 | 50 | 54 |
| Northern States Power of Chicago, common | .. | 65 | 62 |
| Northern States Power of Chicago, preferred | ex.div.7 | 85 | 87 |
| Pacific Gas & Electric of San Francisco, common | .. | 43 | 41 |
| Pacific Gas & Electric of San Francisco, preferred | 6 | 88 | 84 |
| Public Service of Northern Illinois, Chicago, common | 7 | 88 | 92 |
| Public Service of Northern Illinois, Chicago, preferred | 6 | 83 | 85 |
| Republic Railway & Light of Youngstown, common | 4 | 18 | 18 |
| Republic Railway & Light of Youngstown, preferred | 6 | 57 | 57 |
| Standard Gas & Electric of Chicago, common | .. | 11 | 10 |
| Standard Gas & Electric of Chicago, preferred | 6 | 31 | 31 |
| Tennessee Railway, Light & Power of Chattanooga, common | .. | 3 | 3¼ |
| Tennessee Railway, Light & Power of Chattanooga, preferred | 6 | 14 | 16 |
| United Light & Railways of Grand Rapids, common | 4 | 37 | 41 |
| United Light & Railways of Grand Rapids, preferred | 6 | 70 | 74 |
| Western Power of San Francisco, common | .. | 14 | 13 |
| Western Power of San Francisco, preferred | 6 | 54 | 59 |
| Western Union Telegraph of New York | extra | 93 | 91 |
| Industrials— | | | |
| Electric Storage of Philadelphia, common | 4 | 53 | 53 |
| General Electric of Schenectady | 8 | 157 | 152 |
| Westinghouse Electric & Mfg. of Pittsburgh, common | 7 | 45 | 43½ |
| Westinghouse Electric & Mfg. of Pittsburgh, preferred | 7 | 62 | 61 |